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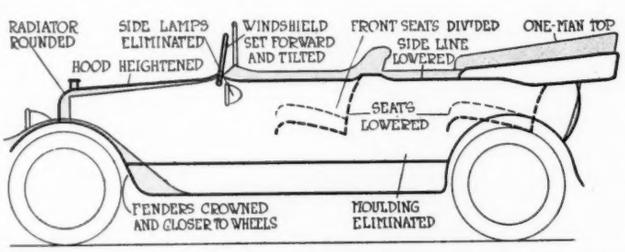
The AUTOMOBILE

Marked Improvement in Body Design

Tendencies Brought Out at New York and Chicago—Touring Cars Better—All-Weather Type Popular

By George J. Mercer

BODY designs for 1915 as exemplified by the cars on exhibition at the National shows in New York and Chicago, show a marked trend toward European practice as compared with the bodies of 1914. Touring bodies show the most radical changes, the side lines from the front of the hood being better; seats being lower and the rear ones narrower; windshields are set ahead of the rear line of the cowl and tilted backwards; front seats are often divided, single doors being used for cars with the divided front seats with four offset doors for bodies with tonneau cowl; body top line continues from back to front without being broken by seat or trimming; bodies are without mouldings on sides or doors; tops are better than last year; disappearing extra seats; tires are carried at the rear and tank either at the rear or under the cowl. The dash lamp has been well-nigh eliminated, while the hoods are generally made wider at the rear to give better body lines in conformity with the rounded radiator and better-shaped mudguards now in use. An important development in all types of cars is the lower effect obtained by dropping the frame, using smaller tires, etc.



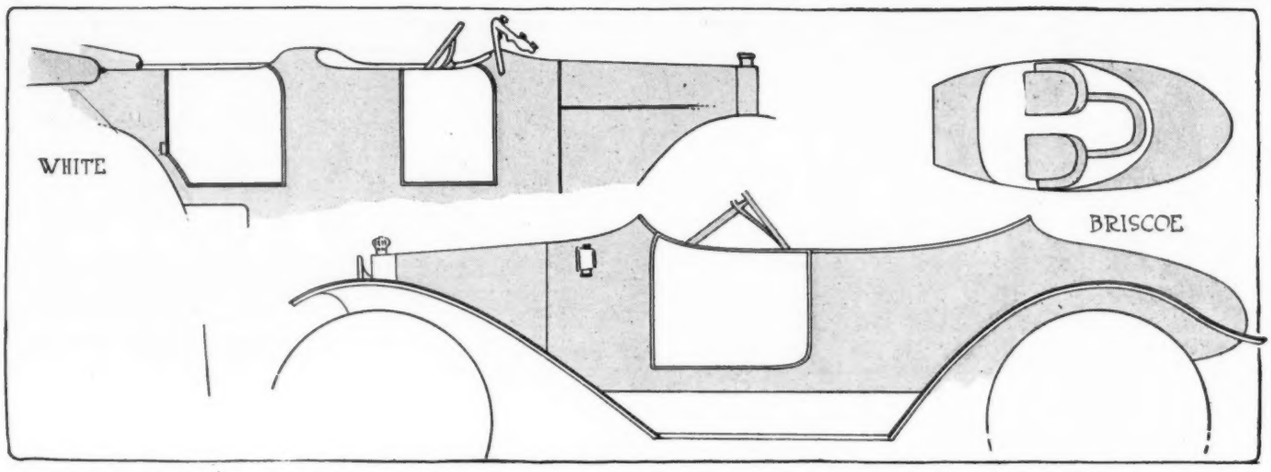
Body Tendencies—Heavy line denotes average car for 1915 while lighter one indicates 1914 body. Tinted portions show the difference between the two. Note better design throughout for 1915

Among the closed bodies the big tendency is toward the all-weather design, though there is also a tendency to push the lighter types, the increasing popularity of the sedan and the all-weather bodies and smaller town cars having resulted in the practical elimination of the berline. Limousine and limousine-landaulet remain stationary as seven-passenger bodies, although they are made more luxurious and comfortable than the types at the exhibitions a year ago.

Runabouts are comfortably built and similar to last year's designs, showing a tendency to use the rear compartment for carrying spare tires.

The electrics showed about the same number as exhibited last year. Rauch & Lang have a brougham similar to the private electric used in Europe and also showed a runabout that is like the conventional gasoline body. Waverley showed a four-passenger car with staggered seats and having oval glass in the rear corners, while the Detroit electric has a five-passenger body with revolving chairs. The Ohio showed a body with a rounded roof. All the upholstery effect is delicate, the glass space is large and the appearance of all the designs is airy and pleasing.

A striking feature of the shows this year was that they were primarily manufacturers' exhibitions, practically all the designs shown being factory-made products. Show jobs and special cars made up to attract attention were fewer than ever before. It speaks well for the exhibits as a whole that the standard product looked so well for exhibition purposes, despite the fact that in many cases the price has been reduced. From a general survey of the exhibits it is evident that the car-buying public is essentially conservative in its tastes, a similarity of effort being apparent in the output of the different makers, although there is a noticeable tendency to break through the thin skin of uniformity on all sides by the marked improvement in the finish of details and the obvious attempt to excel in



Upper left—White touring car, showing deep back of front seat for compartment. Note top line of body. Right—Briscoe full streamline roadster with diagram of seating arrangement

refinement. No healthier sign could be asked than this and there is still room for progress.

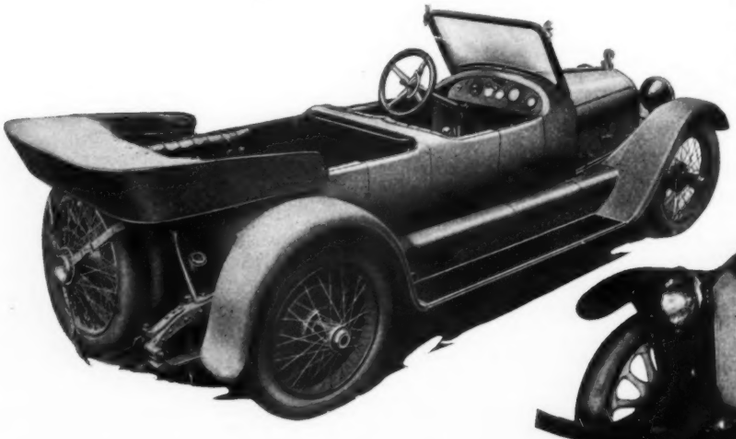
90 Per Cent. Consistent Streamline Types

Over 90 per cent. of the bodies on show were a consistent streamline from the radiator to the widest part of the body, although no touring body was true streamline at the rear. Several reasons exist to keep the present rear line of the touring body as it is, despite the advantages of stream lines in eliminating wind eddies that stir up the dust. One reason is the additional cost; another, and perhaps the best reason, is that the body looks more trim with the line used at present, than with any projecting rear that has been designed; also, the tank is placed at the rear on many cars, and the inlet must be left clear of body extensions for filling. Another reason is that the tires are uniformly placed at the rear and the present shape suits this arrangement. The time is coming when the tires at the rear will be inclosed and the streamline ending of the body will be the tire inclosure.

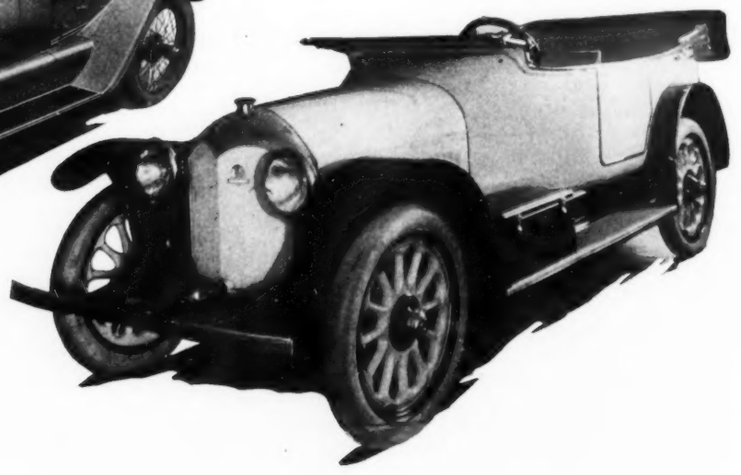
Non-wind-resisting principles can be applied to touring bodies as never before. Bodies are narrower, with room for two passengers on the rear seat as a rule; the side line of the body is a gradual slope from the radiator to the rear round corner; in many cases the windshield is placed at an angle so as to incline backward; the top edge of the body is rounded over, and without mouldings on the body or doors a true flush side is accomplished; running boards are clear and guards rounded over, coming well forward on the front wheel; the rear guards follow the contour of the wheel; dash lamps are left off many cars altogether and the back of the driving seat, instead of showing above the side line, is covered with a cowl that swells slightly toward the center, and the top line of the body shows an unbroken line from the cowl to the rear end of the car.

Trimming Below Body Line

The trimming hardly projects above the body line, several illustrations of this type of body being shown. The average perpendicular height of the body sides is 22 to 23 inches. The seat cushions are nearer the floor, the gasoline tank being placed either at the rear or under the cowl to permit of lower driving seats; one wide door each side and directly opposite is the rule and the driving seat is individual with an aisle for passage to the front from the door which opens directly to the rear seat. Extra seats are less comfortable, they are made lower and fold compactly either in a space provided or directly against the rear of the driving seat. These extra seats are never in evidence except when in use, the backs on some being made to telescope, so that they will fold compactly and yet be sufficiently high when in use. Robe rails and foot rails are found in most bodies and seat cushions are thick with only a moderate slope from back to front. Seat backs are thick and nearly every body exhibited has tufted trim-

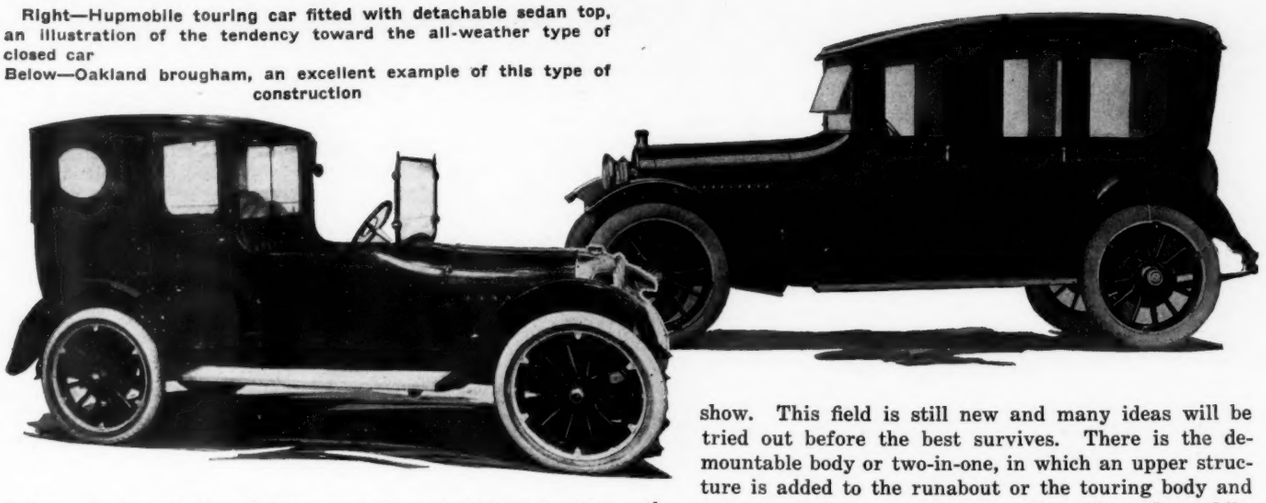


Above—Mercer touring car, showing smooth lines, tilted windshield and rounded-over edges, clean running boards and crowned fenders



Right—Pathfinder touring car, illustrating tendencies in radiator and front-of-car construction

Right—Hupmobile touring car fitted with detachable sedan top, an illustration of the tendency toward the all-weather type of closed car
Below—Oakland brougham, an excellent example of this type of construction



ming. A few of the cheaper cars have imitation leather, but the majority use a good quality of pebble grain black leather, though a few use motor cloth. The National touring body has movable seats and the Cadillac has one revolving seat beside the driving seat.

One-Man Tops Used

The tops are another part of the touring body that show improvement. With not over two exceptions, all the bodies have one-man tops, sensible fasteners being the rule, while the gooseneck, or socket, is sometimes below the body top line and projects out through the panel. When the top is up it is fastened to the stud at the top of the windshield post and straps are seldom used. The top curtains are either stored in a receptacle in the top at the front or attached to the bows, so the curtains are always easy to get at. The Jeffery, among others, uses the Jiffy curtain and the Fischer body has the disappearing top as made by Vanden Plas.

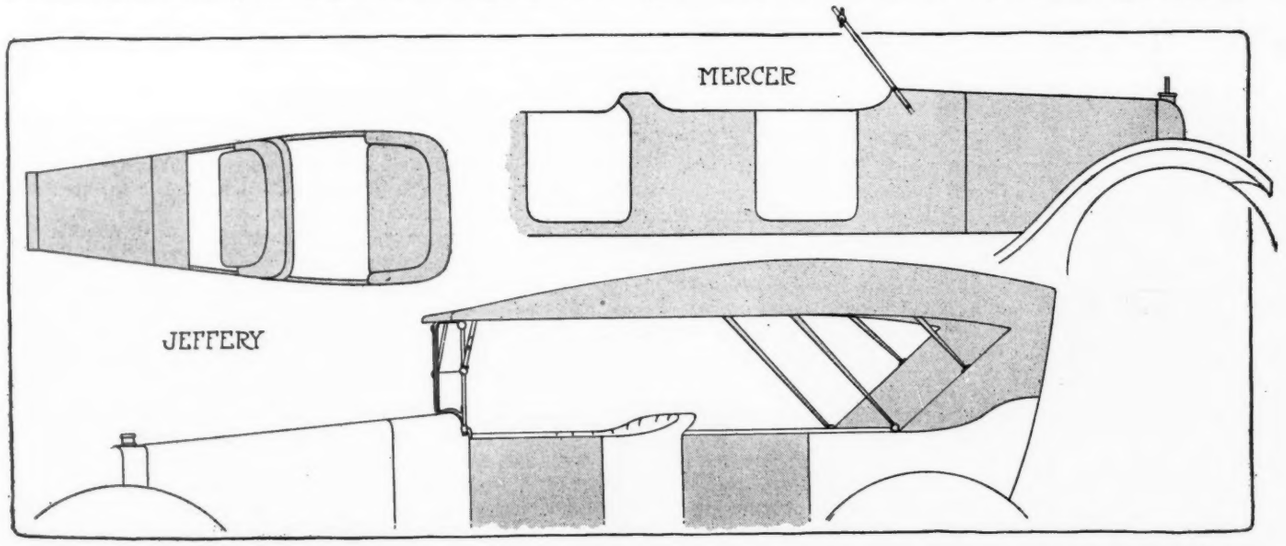
The All-Weather Car

In the closed car field, the trend in designing is toward the development of the all-weather car. The public wants something that is cheaper and lighter and more easy to operate than the landaulet, while the cheap landaulet is like a taxicab. The bodies that have been produced to supply this want show the only real originality in designing at the show. This field is still new and many ideas will be tried out before the best survives. There is the demountable body or two-in-one, in which an upper structure is added to the runabout or the touring body and thus converts it into a coupé or a limousine, Hupmobile, Kissel and Kline being examples of this. Pierce has a stock model on these lines, White has a cabriolet type, Reo has a collapsible type with new character and there are the usual number of coupelets. Springfield has the convertible design that has been marketed for some time past and in addition it has a permanent roof body that is new in design. Locomobile has a similar one made by Henley.

Permanent Roof Has Its Followers

The permanent-roof body has advantages that will meet the wants of a large part of the buying public. The roof is the same in appearance as the limousine roof, and, not being made to fold, it will always look clean and substantial and not creased like a folding top. The front windshield and the rear or back panel are permanent, and the intervening space between front and back can all be opened or closed in a few seconds. These sides are glass frames hinged to swing downward and inward inside the body and doors. The only work needed to put them from one position to the other is to revolve the frame on its hinges. Both these examples are the sedan type and the Springfield body is illustrated, the dotted lines showing the frames in position and the full lines the body opened out.

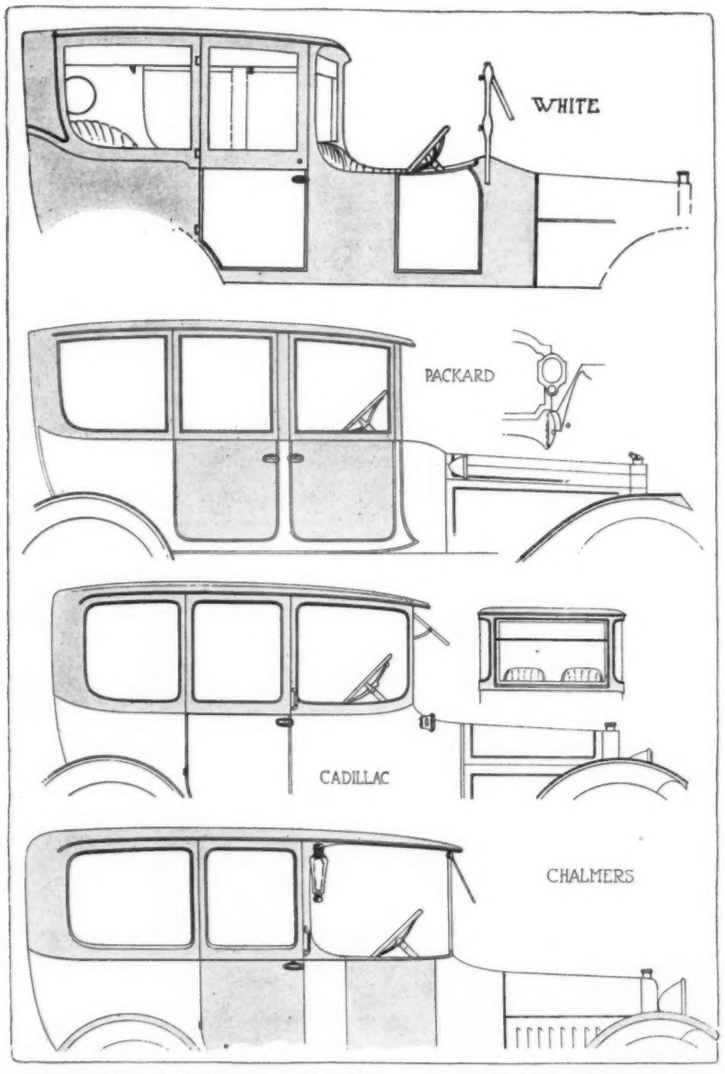
Sedans are found in increased numbers, being a popular type of body for the driver-owner, and the single doors on



Jeffery touring car, showing body lines and blending of hood and cowl. Note one-man top, which type has been widely adopted during the past year. Upper right—Side view of Mercer, showing slanted windshield

each side can always be placed so that they will be of generous width, even on a chassis with short wheelbase. The popularity of the sedan shows the want of compact, lightweight closed bodies and the sedan is taking the place of the berline. Not one of the latter was on exhibition. The town cars exhibited by White and Locomobile show how conservative is the trend in designing for the most exacting of car buyers. Town cars are only purchased by those who can afford to buy luxurious machines and both these designs, which are illustrated herewith, are as near to the horse brougham as it is possible to make them, particularly the Brewster body on the Locomobile. Even the fenders are like those on a brougham, and the whole appearance would easily take one back to the days before automobiles were thought of. Both these designs look as fitting for use on a car as on a horse-drawn vehicle. The Locomobile is more the real brougham type than the White as both are delicately trimmed and both will carry extra passengers inside. These cars are essentially two-passenger designs. The White body is provided with a windshield and a demountable roof to cover the driver, but the Locomobile body has no such provision, the driver's compartment being left entirely open.

There were not many limousine or landaulets shown. Those on exhibition were large and two had chauffeur lights, or windows beside the driving seat, something generally conceded to be going out of practice, two had arched doors and the roofs for the most part had slightly rounded edges. Not more than one or two had the extreme round to the upper rear corner that was common last year, the roofs had a moderate dip back and front; approximately the fronts averaged a drop of 3 to 4 inches and the rear 1 to 2 inches from a horizontal at the center of the crown of the roof. All the limousines and landaulets were seven-passenger bodies and in keeping with the general display seen at the shows last year.



Four types of closed car construction. Detail sketch of Packard shows mud splasher connection with frame, almost as continuation of mud guard. That of Cadillac illustrates use of rounded glass in front windows, which is a graceful and increasingly-popular construction in closed cars

Workmanship Is Good

The workmanship is good and the interior trimming designs show originality. The sedans, the town cars and the demountable or two-in-one bodies are the closed bodies that show the most improvement in design, the coupelets being practically the same as last year. The coupé on the Pierce is an attractive design, in which the seating arrangements for four passengers were cleverly worked out, the driving seat holding three by offsetting the driver's portion forward and opposite the rest of the seat at the front is a folding seat for one. It was a crowded space, but was nearer the arrangement provided in the electrics than any other gasoline car exhibited. The design was like the Pierce demountable last year. The improvements in touring body designing were the most noticeable because there were more of these bodies exhibited than any other.

Disappearing Extra Seats

The extra seats in the closed bodies are about evenly divided between the newer disappearing variety and the old swinging seat, the tendency being, however, toward the disappearing kind. Front seats are made individual on account of the general custom of having a passageway between, but the rear seats are not made thus, as was the case on some of the foreign cars last year.

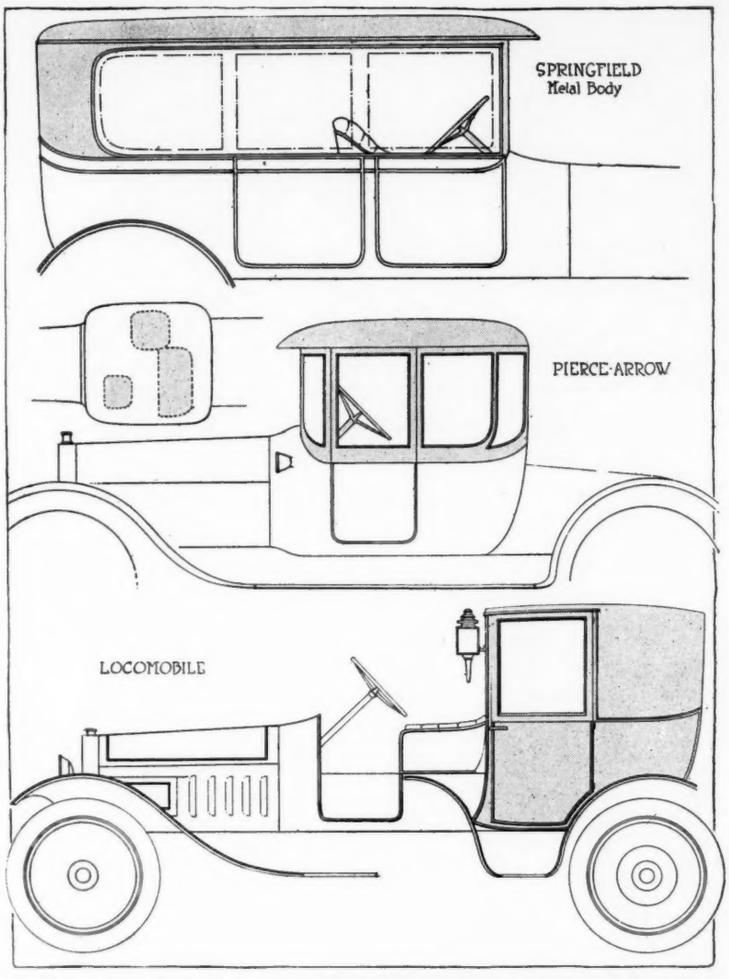
An Original Runabout Design

The runabouts shown are nearly all the conventional type that carry the line of the seat to the cowl, seating two or three. A compartment at the rear is generally used for spare tires, few providing for an extra seat, the Fiat being one of the few. The Mercer, Cole, Oakland and Chevrolet showed sporting runabouts and the Briscoe shows the most original design in the exhibition. This is illustrated herewith. Seating is for three and the middle passenger sits well back of the individual side seats, the rear of the body is egg-shaped and is the ideally streamline body of the shows. Many of the runabouts show a rear shape that is near streamline, but in many cases the effect is lost by the carrying of tires at the rear. The guards on the Briscoe runabout are different from those on any other car exhibited. The Chevrolet top, which is made by the combination of the windshield and the dust shield supporting a deck curtain that forms a roof, while not new in practice, is still a novelty.

Radiators Are Higher

The general trend in radiator design is toward great height and not towards increased width, the flat front surface being minimized by rounding the edges with the greatest curve at the filling cap. On many cars both radiators and hoods have been radically altered. While last year many of the bodies had unbroken lines from the radiator to the body width, this year the lines of the sides are made straighter, the hood has been made a little

wider at the rear and many of the bodies are narrower, so that the side surfaces are graduated in more easy lines from the radiator to the widest part of the body. Heretofore one's conception of the rear seat of a touring body was that it was the most comfortable three-passenger seat on any body. Though this is still true of many designs, the narrower body, either six or four-passenger, is growing in favor. Two noticeable examples are the illustrations of the Jeffery and the Mercer. That of the Jeffery is a plan view and shows how the hood and body lines are made to blend to produce the modified streamline. On the Mercer this is more ideally carried out on the radiator and the tilt of the windshield to 55 degrees. Both these bodies have tonneau cowls and the top edge of the body is rounded over with no mouldings on the sides of the body or the doors. The White touring body is another example. This company has taken the crown off the hood. Touring bodies with clean, straight lines are too numerous to mention in detail. The rounding of the front edge of the radiator is also general, all styles from a 1- to a 6-inch radius being seen. The majority use the small radius, and it is astonishing how this will soften the appearance of the front of the car.



Two upper illustrations are of convertible types, the detail sketch showing seating arrangement of Pierce-Arrow. Lower shows brougham, which is strikingly similar in design to the horse-drawn brougham

Headlight Supports Stronger

The number that use the V-type radiator is approximately the same as last year. The Pathfinder uses this V in conjunction with a rounded top as do Oakland, Paige, Moline and Reo. The Reo has the top cap projecting forward like a hook. Regal places the filling plug on an L-pipe under the hood thus leaving the surface of the radiator clear, the Chalmers big six being another illustration of this.

Franklin is the only car using the Renault hood. This is an ideal hood to eliminate wind resistance, but in this case this advantage is neutralized by using a jutting-out dash.

The fronts of all cars show improvements, the supports of the headlights are more substantial, tie rods across between the lamps are used on all cars and in many instances, rods, or stays, are continued to the guard brace, thus reinforcing the lamp support and making the guards stiffer. One car has the lamps fastened direct to the guard brace with a rod between. With the exception of Pierce and Briscoe, the balance have the headlights fastened to the frame.

Many cars dispense with the dash lamps and make the headlights do double duty.

The blending of the hood line into the cowl is uniformly good on all touring and runabout bodies, and the method of fastening and designing the windshield is also good.

Blending-in the Windshield

On some of the body designs that are newest in design, the windshield is placed forward of the back edge of the cowl. The White and the Mercer are illustrations of this. The shield can be set at an angle and the plan view of the cowl shows a line that is elliptical, and the back edge of the cowl blends with the top line of the body in a curve. The effect from the side is to make the cowl look more like a logical continuation of the hood line. A number of illustrations are given, and on the Overland a lamp attachment is integral with the windshield foot. The windshields on these bodies are made to look a unit with the body, the supports and the frame surrounding the glass are lighter-looking than formerly and in nearly every case, made to swing in two sections, the lower half swinging inwardly for ventilating the body.

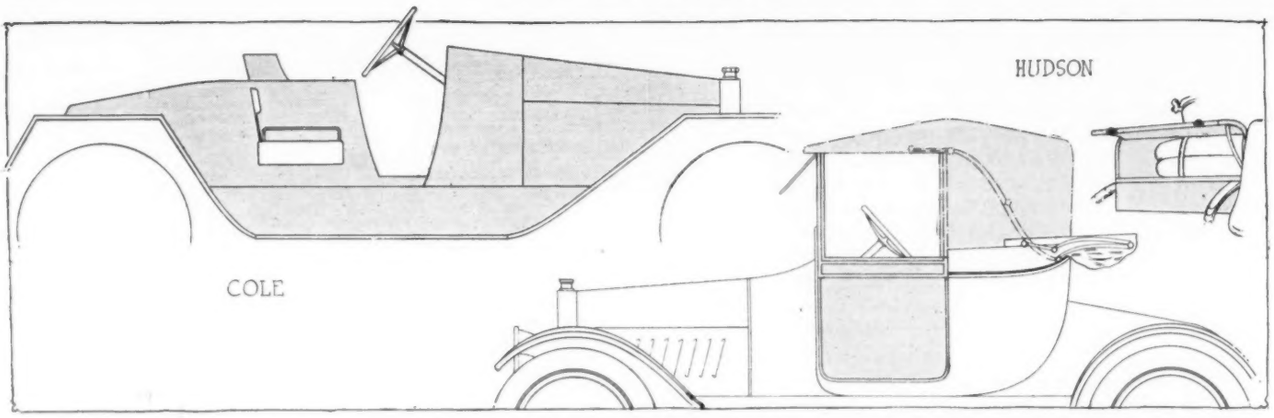
There was only one cowl with a ventilator on the top and there was not, to the writer's knowledge, a single ventilator on the side of the cowl. Pierce has the ventilator at the base of the shield, but this would only be the equivalent to the windshield that has the lower part swing inward.

Wire wheels show a slight increase, again being most noticeable on cars fitted with runabout bodies.

Running Boards and Shields

Running boards and running-board shields have received more attention this year, the majority of makers using linoleum-covered boards with metal binding. A few use the cast aluminum boards and some prefer pressed pyramid metal in place of linoleum. The latter is used on most of the cars for covering the floorboards in the driver's compartment. Flush-sided bodies extending wider than the frame have necessitated the more general use of the running-board shield, this generally extending a little beyond the body, the space between it and the chassis being utilized for tool compartments, as on the Overland. Every car on exhibition had a clean, unlittered running-board, and, with two or three exceptions, the extra tires were carried at the rear. The tire supports are part of the regular equipment and many of them are made to carry the weight of the tire by resting against the demountable rim instead of having the tire weight rest on the tread of the shoe. Most of the carriers have a locking device to prevent theft.

There have never been at any previous shows so many cars having well-designed and well-made mudguards. At least



Left—A roadster type which has been described as Cubist. Note the straight lines and the extra seat shown in white which slides into the body like a drawer. Right—Popular cabriolet construction. Detail sketch shows method of carrying spare tires in rear compartment

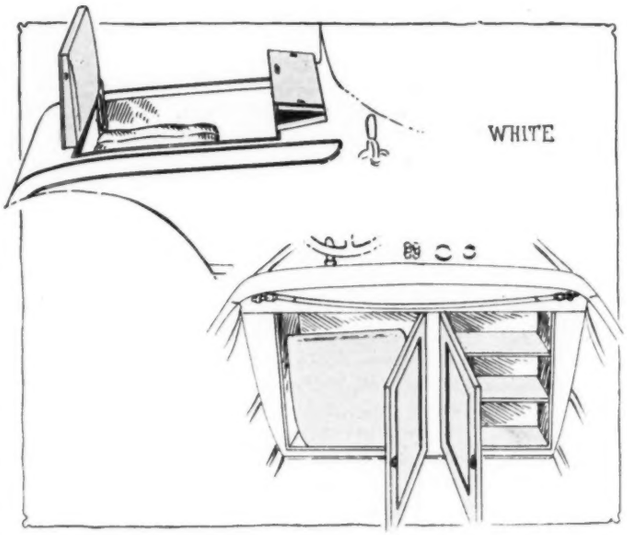
75 per cent. of the cars on exhibition have guards with crowned tops, the majority having the slight crown with a flat margin along the edges while a few have the true dome guard in which the skirt or flange is one with the top. The Pierce is a good example of this, the front guard coming well over the wheel at the forward end and inside wing of the guard looping down to entirely cover the front of the chassis frame where it joins with the mud-splasher. Packard cleverly combines the guard wing with the splasher, the side wings of the latter being very deep and covering the opening between the frame and the spring forward of the radiator. These two examples are illustrated herewith. Over half of the cars at the shows were equipped with splash guards.

Tail Light on Mudguard

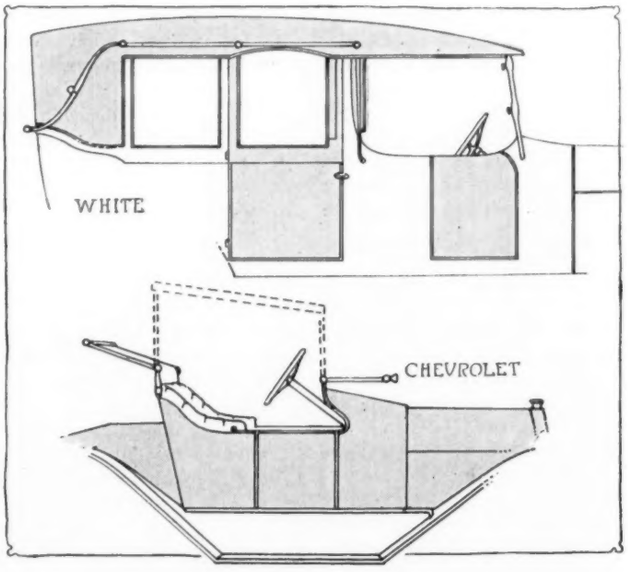
The location of the tail light on the rear guard is also more common, most of the guards encircle the wheel and the rear of the guard is lower than the frame so that tail lights can be placed on the guard and be the same height as when formerly placed on the frame, also the gasoline tank is more commonly placed at the rear and space is needed either beside or between the tires for filling. On several of the runabouts space is provided in the rear compartment to carry the extra tires. One illustration is given of the Hudson showing the tires in position. Pierce, Paige, Chalmers, Buick, Cole and others use this plan. On the Pierce coupé and the Dodge Bros. runabout the method of attaching the rear guard to the body is worth noticing; in place of the V-shaped pocket between the guard and the body, the inner wing of the guard is shorter than usual and attaches to the body on a line well up near the top line of the guard. The wing is concave, forming a gutter which will easily shed all deposit.

Tasteful Trimming Effects

The trimming material on the closed bodies showed more lavish display of color than the exterior of the bodies. On the town cars delicate shades of broadcloth are used and hardly any broadlace; on one town car the broadlace was replaced by a flat band of broadcloth and padded to look full. Pierce and Packard both showed closed bodies that were trimmed with material that was new in design. Packard had one body trimmed in a tapestry with green and brown markings and the curtains were brown. This was a sedan and the driving seat was trimmed with leather, while the back was of material to match the rest of the body. On this body the relish around the window openings on the outside of the body was painted a pale yellow. No broadlace was used on the body trimming, the doors had locks and all closed body doors had the double catch. Another Packard was trimmed with a green pin stripe velour or plush material and green silk curtains to match. One Pierce limousine had the seat backs and



Two details of the White. Upper—Folding extra seat in rear compartment of runabout. Below—Compartment for folding tonneau seat and cupboard in back of front seat on touring car



Upper is another illustration of the tendency toward all-weather cars. Lower shows novel roller top which works like a window shade

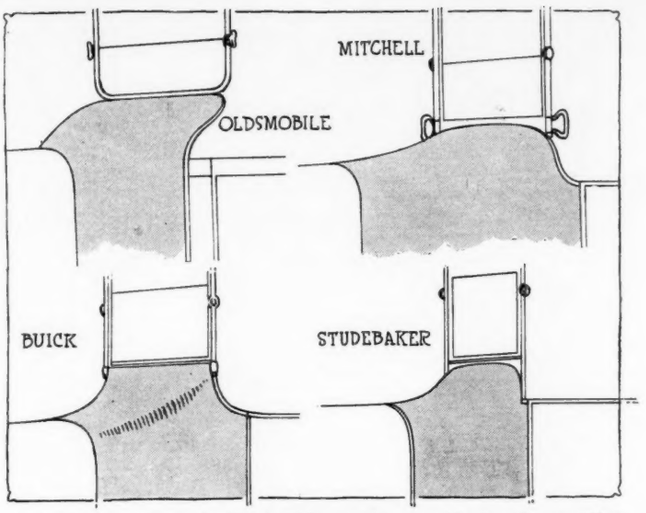
sides trimmed with a gray mixed material below the waist line and above this the trimming was a green plush. The garnish rails also were covered with the same cloth. Most of the bodies had grab handles and the majority had pillar lamps and some had the lamp that hangs from the top. Pierce uses a system of semi-indirect lighting for its closed cars. The window glass was without exception of the frameless variety and regulators for lifting were used to some extent, but there seemed to be more bodies using the lift straps than there were last year. Lift straps this season are all made to slide in a slot in the trimming and do not hang loose as formerly. The interior of the bodies are equipped with reading and dome lights and corded hat slings. Small arm rests are the rule on the rear seat, but they are the soft variety and do not stand out beyond the trimming over 1 1-2 inches. Arm holders are used on a few designs, cord robe hangers are used and foot rests or pillows are in all bodies. Cadillac was one of those having wood trim along the top line of the trimming.

Mahogany Interior Finish

Wood used for the interior finish was uniformly mahogany and the metal finish was nickel or silver. Toilet cases were not to be seen, probably on account of the danger of theft, but it seems to be the tendency to use the built-in toilet case in place of the older style. Many of the closed bodies had round corners to the window openings and many of the rear windows were smaller than they were last year. Oval-shaped rear windows are used more than last year.

Dark Colors the Rule

Painting of the cars is uniform both in color and quality, the dark colors being used almost altogether, although there were a few grays, one coupé was painted yellow and red, there was one yellow and black touring body and one black and white car. Packard had a green and black sedan and Pierce had one touring body, gray and black, and one in two shades of brown. There was also one cream and black touring body on a Winton, one touring body was trimmed with art finished leather and there was the Cole runabout and one other with red leather. Blue and black are the prevailing colors and the finish is good throughout, the guards and hoods showing a particularly heavy bodied finish. Windshield metal parts and lamps were for the most part black and there was far more nickel than brass finish used.



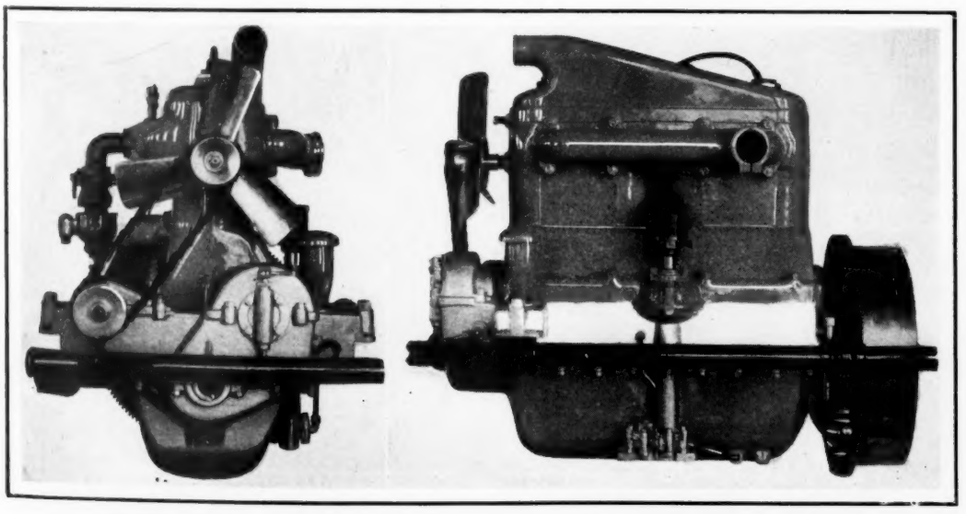
Four types of cowl, illustrating various methods of mounting windshields

America's Smallest Knight—The New Moline

THE illustration herewith shows the new Moline-Knight motor, which is of interest because it is the smallest Knight engine which has so far appeared in America. In general design the new motor is almost identical with the larger Moline-Knight motor but has a bore of 3.5 and a stroke of 5 inches. It is a block-casting, a clean exterior appearance and the only way that the new engine can be distinguished from its older prototype is in the novel way in which the ignition wires are carried up through the cylinder head between the two central cylinders. The only exposed wiring with this scheme is in the ignition connections, where the short leads go to the spark plugs.

Ignition is supplied by the Connecticut battery system and the balance of the electrical equipment to be used in connection with this motor on the new small Moline-Knight car is made up of a two-unit starting and lighting system. Lubrication is by force feed through the hollow crankshaft by means of a gear-driven pump, as in usual practice.

Cooling is by thermo-syphon and another external change in the motor is in the alteration of the exhaust manifold to give a more direct flow for the gas and hence tend to reduce any possible back pressure in the exhaust line. The car in which this motor will be placed has a wheelbase of 118 inches. The power is transmitted to a leather-faced cone with cork inserts and the gearbox is a selective sliding three-speed design located amidship and having double-universal joint connections between the engine and transmission.



Left—Front view of new Moline-Knight motor. Right—Left side, showing clean design

War Trucks Arrive in France

220 Quickly Put Into Condition for Service at the Front—Each Truck Goes Through 25-mile Test—Some Damage on Rough Ocean Voyage

By W. F. Bradley

Special Representative of THE AUTOMOBILE with the Allied Armies in France

LE HAVRE, Jan. 1—Two hundred and twenty automobile trucks, 1 day's supply of wheat for the French army of 4,000,000 men, miles of barbed wire, scores of machine tools, and tons of horseshoes and shoe nails, forming America's contribution to the armies of Europe, have been brought together under one roof. The 220 automobile trucks, brought over on one steamer, represented a portion of that order for 2,540 placed by Lieutenant Lumet, the representative of the French army, with the White, Pierce, Packard, Kelly-Springfield and Jeffery companies.

Quick Action the Rule

These automobiles are coming into port with regularity. Without a moment's delay they are unshipped, unboxed, filled with gasoline, oil and water, tested, and sent off to the scene of military operations. The sight in itself is interesting. As the cases are slung out of the hold they are placed on a lighter, lowered on the dock side a few yards away, and immediately attacked by gangs of French soldiers. The work is done in the open, by the side of a busy road down which natives, fresh English troops and train loads of French and Belgian wounded pass in an almost endless procession.

One gang of soldiers takes off the top and the sides of the case, another set puts on the wheels, more fill up with gasoline and water, others armed with crowbars separate the planks forming the case and load them on the truck. There is labor in abundance, for military labor is cheap in France; there appears to be a superfluity of men, but the work goes on with rapidity and every hour a group of trucks is moved away under its own power to a big military garage in town.

Each of the firms having supplied trucks has sent experts to France in order to examine the machines before handing them over to the military and to give the necessary instructons to drivers. At the time of my visit to Havre the men present were L. G. Williams and E. Selman for the Pierce Company, John L. Greene and Fred D'LaBarre for Packard; W. H. Morgan, E. W. Bassett and E. M. Shields, and two Englishmen, for the White Company, and two representatives of the Kelly-Springfield Company. No Jeffery trucks were being received, although some were at work in town, and no representative of the company was present.

Twenty Trucks Wrecked

The task of the American engineers has been considerably increased by the fact that some of the trucks were carried on deck during a very rough passage. One steamer, which came in while I was at Havre, carried 220 trucks, all of them boxed, and forty of them fastened on deck. Of these forty there were twenty which could only be sent to the junk heap. The boxes had entirely disappeared, having been burst in by the heavy seas and the wood carried overboard. Having no protection, and merely held down by the ropes which had originally passed over the boxes, the trucks whipped backwards and forwards across the deck until frames were broken, wheels and axles carried away, fenders reduced to crumpled iron, and steering wheels represented by two or three spokes. Somebody is to blame for having shipped automobiles as deck cargo in mid-winter. Even the trucks carried in the hold suffered slight damage by reason of the cargo shifting. Packard had several cases of broken steering wheels owing to

Scene on board one of the transports on arrival at Havre. Note that all the trucks were completely boxed when they left New York

an upper truck breaking through a lower one. The reels of barbed wire placed on top of the cases were also responsible for some of the damage. White appears to have suffered most severely, but this may be attributed to the fact that these machines were in a majority on the deck. Pierce trucks were the least damaged, there being but one out of 166 which needed any attention. This firm used 1 inch planking for its boxes, while some others considered half-inch boards sufficient. These latter were liable to break through under the weight of the truck.

Water Causes Damage

Even when no damage was done, a lot of annoyance was caused by water getting into magnetos and carbureters. In a shack by the side of the docks a dozen American engineers dissected sodden magnetos, hung armatures to dry over a stove, patiently got the rust out of distributers and bearings, and removed the brine from carbureter jets. To protect against rust most of the cylinders had been filled with oil. This added to the starting difficulties, some of the vehicles having to be towed before the motor would respond. Notwithstanding these difficulties, there was practically no delay, the trucks being got away from the dock side as fast as they could be unloaded from the steamer.

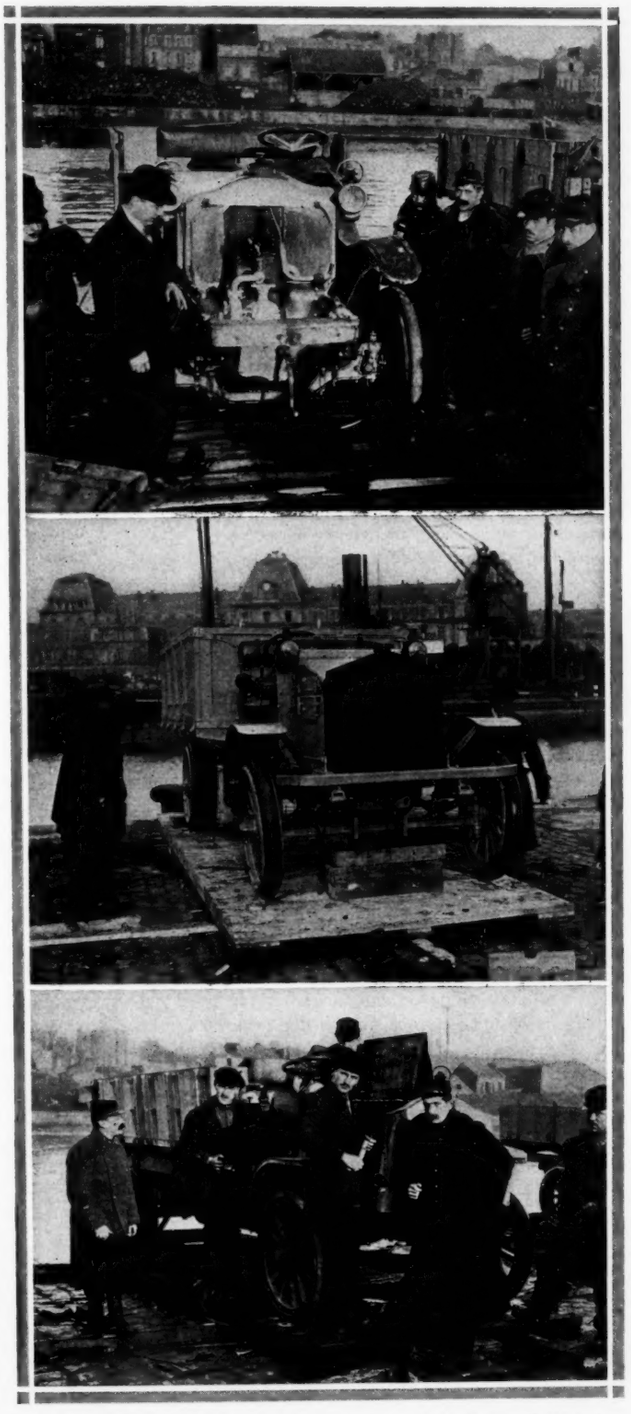
25-Mile Trial Trip

Two big depots have been established in Havre for the reception of the trucks. They are only kept here a few hours, for every day a convoy of about twenty is sent out for a 25-mile road test. The factory representatives go with these convoys, give all necessary attention to the machines and a certain amount of instruction to the drivers. Instead of coming back to the depot the trucks enter an important fort and from then on are entirely military property. The work of the factory representative ends with this trial trip. From the fort at Havre the vehicles are sent in important convoys to Versailles or Montlucon, from which towns they are drawn upon by the forces in the field.

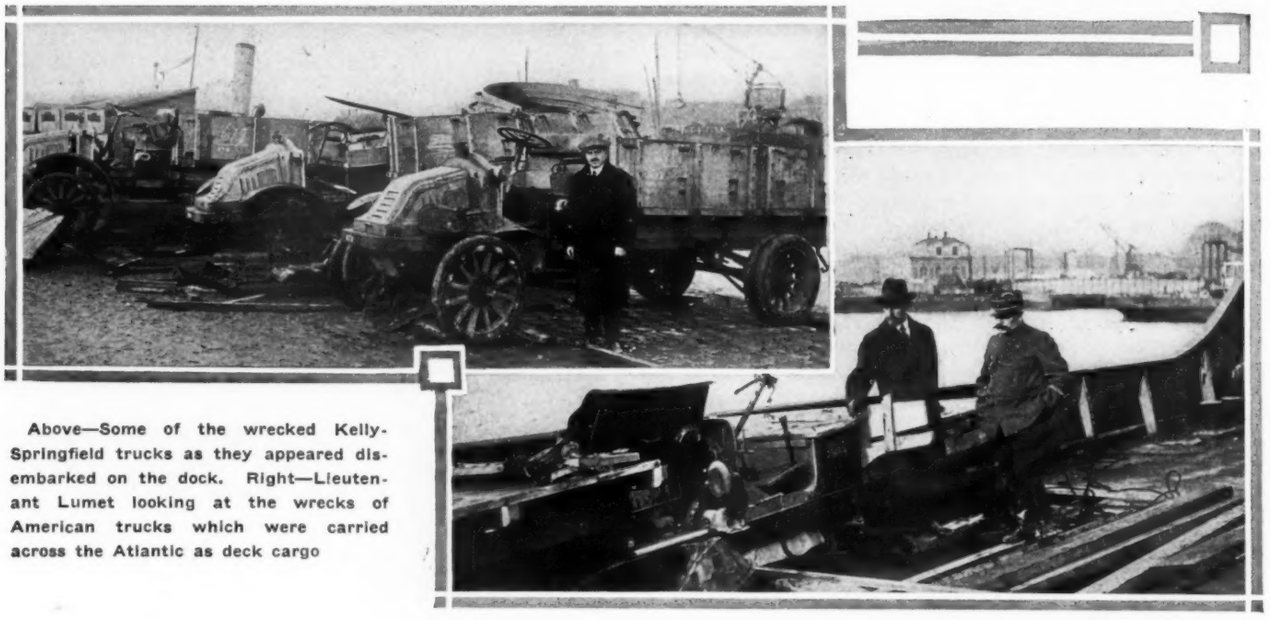
Ignorant Drivers

There is very little time to instruct the military drivers in the handling of the trucks, and unfortunately in many cases this instruction is badly needed. In France no person is allowed to take charge of an automobile until he has passed a practical government test, and in asking for volunteer drivers for the automobile section the army appears to consider that the possession of the official driving license is proof of ability. As a matter of fact this is not so; many men appear to have struggled through a superficial examination and in the intervening period to have forgotten the little they ever knew about automobiles. There are cases of men who had not learned to use any other than first and second gears; who never declutched, but stopped by using the brakes and stalling the motor; who did not know that water had to be put in the radiator; who as a preliminary to starting flooded the cylinders with gasoline until it ran out of the exhaust pipe. By the side of these were men who were first class in every respect and who could be relied on to get the very best service out of the trucks. Good drivers are not lacking in France, and the easier life at the steering wheel, compared with that in the trenches is sufficient to bring them forth. But the army has made the mistake of taking all who offer themselves. It thus happens that a gardener who once went round the block on an old single-cylinder machine is put in charge of a first-class truck while a skilled mechanic is wasting his talents as an infantryman. To overcome, in a certain measure, these adverse conditions, the Paris branch of the Packard company is making arrangements for the transfer of all its former drivers from the line regiments to the new Packard trucks.

All French purchases have been for 2- and 3-ton models. Orders for 4- and 5-ton trucks have been placed with American manufacturers, but these have come from the English army authorities. There appears to be a divergence of opinion as to the value of the two types. The French, who really ought to know conditions in their own country better than anybody else, some time ago decided that a 3-ton load was the maximum that ought to be carried. The English are bringing over 4- and 5-ton types for work under the same conditions. As the roads behind the line of troops have seriously deteriorated during this winter campaign, it would



Upper—French soldiers interested in a Kelly-Springfield being prepared for them. Middle—A Pierce unpacked, stocked with gasoline, water and oil, ready for service with the French army. Lower—Messrs. Greene and D'LaBarre preparing a Packard for waiting French soldiers



Above—Some of the wrecked Kelly-Springfield trucks as they appeared disembarked on the dock. Right—Lieutenant Lumet looking at the wrecks of American trucks which were carried across the Atlantic as deck cargo

appear that the 3-ton load can be handled with greater advantage.

The question of spares has been settled by purchasing a certain number of knock down chassis from each manufacturer. These motors, axles, frames, wheels, etc., are sent to the big automobile depots established in France and made use of when trucks are returned to the rear for repairs. In addition to this, the Pierce company has consigned a considerable stock of small parts to a depot in France and has made arrangements to supply them to the army as required. This move is so highly appreciated that I understand the other firms are being asked to follow suit. Pierce has also taken the trouble to issue very detailed instruction books in French. Packard has prepared dashboard plates giving, in French, all the information a driver ought to know. All trucks have come through with American tires built to American standards. It is believed that these will be retained and continued when replacements become necessary, for although American size tires are not made by French tire firms, they can be secured by ordering in advance, and can be bought at any time from the French factory of the Goodrich company.

A Jeffery truck being driven by French soldiers

The stories of American junk sold to the French army are ridiculed in France. Lieutenant Lumet, who was sent to America as the representative of the French army, confined his dealings to Packard, Pierce, White, Kelly-Springfield, and Jeffery. An attempt was made to get him to deal through an intermediary, but the French envoy refused to be tied in any way. He personally visited the factories and only purchased what he knew to be reliable goods. The French were fortunate in their choice of a representative, for in civil life Lieutenant Lumet is head of the technical committee and laboratory of the Automobile Club of France, and is one of the few experts not tinged in any way with trade connections. It is a known fact that some of the purchases made by the Allies were carried out by intermediaries having no technical knowledge, but with a high financial interest in the transaction. France is satisfied that she has got honest goods at an honest price and has made good business connections.

Of the 2,540 trucks ordered by the French army more than half have now been delivered. Owing to congestion there was a little delay in handling the first consignments at the docks, but this has now been overcome, and as fast as steamers arrive they are unloaded and the trucks sent away. In many cases an hour does not elapse between the placing of the boxed truck on the dock side and its departure for the army depot. At this rate of progress the first order should be completed by the end of January. Before the end of the year one of the central depots had 300 American trucks in readiness to go to the front at a moment's notice. Before these lines get into print it is certain that several hundreds of the trucks will be within sound of the big guns.

Taking Forty American Trucks to the Front

FORTY American trucks, eastward bound, passed through the gates of Paris without attracting the least attention. They were driven by French army chauffeurs, they carried a few French soldiers, they were accompanied by a couple of French touring cars with sub-officers aboard. But the public is not sufficiently initiated to distinguish between French and American trucks; a French soldier is too common a sight to cause the eyes to be raised; indeed, it is the healthy-looking man in civilian dress who attracts unfavorable at-

tention these days. Thus the convoy passed out of Paris, bound for the firing line, with even less attention being paid to it than to the string of market carts coming in at that particular moment. The drivers of those carts had to comply with civilian regulations, and there was the town tax to be collected, for war does not lessen the activity of the tax collector.

Those forty American automobiles were divided into two convoys. In the lead were twenty Pierces and a mile in the rear were twenty Packards, all 2-ton models. A month before those machines were respectively in Buffalo and Detroit. Ten days before they had been swung out of the hold of a steamer at Havre, they had received their last finishing touches at the hands of American engineers, and had then been sent by road to an important automobile depot outside Paris, where they formed part of a fleet of 6,000 automobiles of every known make and type, ready to be moved to the front in accordance with orders from headquarters. This reserve depot is not the only one maintained by the Allies in France. In the center is another important station where an equally large number of automobiles is maintained for such calls as the headquarters staff thinks it necessary to send out. We are all in ignorance of the general plan, and it would serve us little to know it. But this much can be perceived—that at a certain critical moment the general staff may decide to rush some momentarily weak point, and when that moment arrives it will be necessary to move the men up quicker than they can be transported by train. This is one of the few romances of war, that troops who are 30, 40, 50 or 60 miles away can in a few hours be carried forward and flung into the battle line before the enemy has had time to realize their existence. This happened in the rout of the Germans crowding on Paris—and it may happen again.

The two convoys in which we are interested were engaged in no such dashing scheme. They had laid in the reserve depot 3 days when the order came to move them up to the gare regulatrice—the railroad distributing depot—occupied by the 5th army corps. At 7 a. m. the next morning they moved away to a signal given by whistle.

Never, until I joined this convoy, did I realize the importance of good drivers for automobile trucks. In reality there were two convoys, for the twenty Pierces and the twenty Packards were in the hands of different officers, having identical orders and instructions to keep in touch with one another. The Packards went away first, although the order should have been inverted, for it was soon evident that the Pierces were governed for a higher speed. However, matters soon righted themselves outside Paris, when the Packards were drawn up to wait for a straggler and the Pierces went ahead. After 3 hours' running with the convoy of Pierces, the truth was impressed that there is nothing more monotonous than traveling with a well regulated convoy. A maréchal des logis, a meek, unmilitary type of man with little initiative, rode on the first truck and let things take their course. The driver of the leading truck was a professional chauffeur who had, up to a week before, been at the wheel of an armored car. He understood automobiles, he had a mechanical instinct which put him at ease with a make of machine he had only known for a few hours, and his knowledge of the country was sufficient to remove all hesitancy at cross roads. Thus the officer buried himself in his greatcoat, or awoke to smoke a cigarette, and occasionally to look back at the line of trucks trailing over the sand-colored road. If there were any inexperienced drivers in the convoy, they knew enough not to make themselves conspicuous. Each man kept his position in the column, maintaining his regulation pace of 30 yards from the truck ahead, and when occasional stops were made at the entrance to important villages, it was to discover that there were no stragglers, and that there were no interpositions in the numbers 1 to 20 carried on the tailboard of each truck. At each of these stops the touring car bringing up the rear would run to the head of the column, report to the officer and receive instructions from him, and 5 minutes later the column would be on the move again. A railroad train never moved with greater regularity, and during the 2 days I spent with them I never saw a driver in this convoy open his tool box or do any other work on the truck than the removal of the floorboards to give him the benefit of the heat of the motor.

The second column, to which I dropped back in quest of more incidents, was in charge of a young, energetic maréchal

Left — Column of Packard trucks lined up in a village back of the firing line

Right — Some of the Pierce war supply trucks on the road in France

A supply column of Pierce trucks in the service of the French army

des logis, who had not been long in discovering that he had been given a difficult task. Five of his twenty drivers were green hands, and those five men were capable of disorganizing the entire convoy. Even on a straight, easy, road the difference between the two convoys was apparent. On hills men clung to top gear much longer than was necessary; when when they tried to change down they fouled their gears, came to a stop, allowing the truck behind to close up to such an extent that there was danger of a collision. The order in which they were numbered was not long maintained. The good drivers got in the front, the first half dozen vehicles came along with some regularity, while the others followed at varying intervals, and one man was nearly always an hour behind the leader.

During the afternoon, when traveling over the hilly country between Meaux and Lizy-sur-Ourcq, where one of the fiercest phases of the Battle of the Marne was fought, the driver of a Packard used his brakes in such a way that he bogged his truck in one of the ditches used last September by the Germans in their retreating fight over this country.

It was almost dusk when this incident occurred. Experienced men might have had the truck out in half an hour, but the green hands labored with pick, shovel, and rope for a couple of hours before the Packard was back on the road. It was then dark; only side lamps were fitted and not a man in the convoy knew the road. The next trouble was on a winding down grade, when a driver charged a tree in endeavoring to get round a bend. His radiator was damaged, but by frequent stoppages for water he was able to keep going. Before midnight the inexperienced men were physically exhausted; the more competent drivers were suffering from nerves, and the blunt expressions of opinion which were passed from man to man did not tend towards harmony. It was not until 1 a. m. that the convoy ran into the gendarmerie courtyard indicated as the stopping place for the night. But the last few yards brought another accident. One of the men, worn out and nervous with the work he was little accustomed to perform, missed the entrance to the yard and took his truck on a bee line for a low bank. The Packard mounted it, but in doing so smashed its crankchamber. The men were dismissed at something after 1 a. m.; the convoy of Pierces, which had left Paris at the same time, had reported in at 6 o'clock, and the men had all been off duty at 6.30 p. m.

Men, Not Trucks, at Fault

Next morning the Pierce convoy was ready to move off at 8 o'clock, every unit being in perfect shape. The second convoy had one truck which must be towed and a second which needed frequent applications of putty and water to its radiator. Thus, in the first column the men were enthusiastic on the subject of American trucks. In the second, while they had sufficient sense to recognize that the men and not the trucks were at fault, there was no superfluous enthusiasm on any subject.

The fault was that men had been selected without sufficient inquiries as to their ability to handle a truck, the government driving license being considered sufficient guarantee. One man admitted that he had never previously driven anything but a motorcycle. Another, evidently the son of a wealthy family, had had just sufficient driving experience on one of his father's cars to get the government ticket. The lurid remarks of a professional Paris chauffeur who was obliged to drive behind the young man of wealth would be interesting reading, if they could be translated.

Trucks Climb Hill Well

The Pierces moved ahead and were not seen again until night. Despite the truck in tow and the vehicle with the leaky radiator, the second convoy moved forward much better than on the previous day; the men were shaking down to their work. Nevertheless, the maréchal des logis was kept busy running up and down the line in his endeavor to prevent some of the stragglers dropping off altogether. As the man at the head of the column was unacquainted with the country, I offered to act as pilot into and through the town of Chateau-Thierry. There are two roads out of this pillaged and bombarded riverside town, one of them comparatively easy, the other very difficult to climb. In order to have the opportunity of seeing what the trucks and drivers could do under really severe conditions, I took the difficult road, and, getting into low gear, watched the convoy climb the greasy hill side. Nothing happened; at the sight of the hill and the thick mud all the men got into low gear and the hill was climbed with more regularity than any previous portion of the road had been covered.

Our journey ended at Fismes, where there is a railroad station from which these trucks have to deliver food and ammunition to the troops billeted in the villages and farms around, and in the firing line a few miles to the north. In this stage of the war the work is of a very regular nature, adhering closely to a prepared schedule. The movement of the troops is measured in inches and yards, thus day after day these American trucks going out from the station to the bivouacs, or to designated points immediately behind the trenches, with as much regularity as they might undertake a delivery service at home.

Before they were put into this service there were some staff changes. The men who had shown their incompetence on the initial run were removed from the steering wheel and replaced by others of proved ability. Whereas on our run to the front there had been but one touring car for twenty trucks, there were two for each convoy—one ahead and one

Line of Packard trucks in French army with touring car which convoys them

astern—for all the work along the front. The mistakes which only entailed a delay on the run from Paris would certainly be followed by death or capture when working near the firing line. Further, at least two men were carried on each truck, and both were armed, for although it is not the business of the supply columns to fight, the men have to be prepared to resist an attack.

The district in which these two American columns are now working was the scene of one of the most bitter phases of the Battle of the Aisne. At that time the lines here were held by the English, who drove the enemy back, step by step until they got them over the rivers Vesle and Aisne, and into the heights above the Aisne, where they have been strongly entrenched for some time. Much of the work has to be done away from the main highways, the surfaces being equivalent to those of the average country road in Indiana or Ohio at this period of the year. At places, where shells have fallen, or traffic has been particularly heavy, it is necessary to go further west to get the equivalent of the roads over which the columns are working. The difficulties are increased, too, by the fact that there is more traffic than on similarly surfaced roads at home. Despite efforts to keep traffic as much as possible moving in one direction, there must be a certain amount of passing. The congestion in these small railroad stations, of no importance until war broke out, is difficult to describe. It is like a busy approach to the New Jersey ferry, with the space reduced one half, all the civilians removed, and automobiles representing 90 per cent. of the traffic.

Noises of War Many—Signs Few

As to the direct signs of war, there are few. There are more sounds than signs. The boom of the heavy artillery, the sharp crack of the French 75 mm. guns, the hiss and plop of shells maintain an unending concert, but nobody but a newcomer pays any attention to them. It is so impersonal, there is so little to see—men may remain within sound of the guns for weeks without seeing a battery in action—that until a shell drops in the immediate neighborhood the truck drivers look upon their business as the real thing and the fighting something distant and intangible which does not directly concern them in any way.

These forty American trucks I was able to follow to the front represent but a small company of the American automobiles now serving with the Allies. The present time is one of repairs and preparation, and the arrival of foreign machines in big quantities is making it possible to overhaul, and replace when necessary, the French trucks having been on duty since the outbreak of hostilities.

Recent Court Decisions—Driver Loses

By George F. Kaiser

ALABAMA court refuses to let woman driver recover damages for injuries from a motorist.

In a recent Alabama case a woman started an action for damages for injuries, alleging that a motorist was negligent in failing to stop his car when her horse became frightened. The horse upset the buggy in a ditch and the woman was thrown out and injured.

The court said that the common law rules requiring reasonable care on the part of automobiles to avoid injuring others made them liable only for negligence, because they had the right to use the highway in common with other vehicles and further, that the rule is, and always has been, that while a person may travel on a highway with a conveyance, or a loaded vehicle which is liable to frighten horses, he must, while doing so, exercise reasonable care to avoid accidents and injury to others traveling on the highway.—*McCray vs. Sharpe*, 66 *South* (*Alabama*) 441.

Discount and Commission

In a late Georgia case the court held that a contract, in order to provide for a discount and a commission, must be clear in its provisions referring to them.

The court said that when a contract is too vague and indefinite as to the relation established between the parties, and it is impossible to determine whether a contract is one of agency or purchase, both a discount on the price of cars purchased and a commission on the selling price being claimed, the discount and the commission are so inconsistent as to be incapable of enforcement, unless it is alleged that there is a discount and a commission in addition thereto.—*Jones vs. Americus Automobile Co.*, 83 *S. E.* (*Georgia*) 642.

Conditional Sale Held Valid

In a recent Missouri case a conditional sale was attacked but was held to be valid by the court.

A manufacturer had sold an underground gasoline tank on conditional sale. No part of the purchase price had been paid. The party buying the tank subsequently resold it to another party who purchased it in good faith. The resale was in violation of the conditional sale contract and the manufacturer brought an action of replevin to recover back the tank.

The Missouri statute required that conditional sales contracts be acknowledged and filed like chattel mortgages.

The court decided that when the statute governing conditional sales refers to the statutes on chattel mortgages, and the latter are modified, the former are also modified by implication. Filing in the office of the recorder of deeds by the manufacturer was, therefore, held to be sufficient notice to the person who took the property on the resale. The manufacturer was allowed to have its property back.—*Company vs. Garwitz*, 170 *S. W.* (*Missouri*) 927.

Motorist Responsible

A motorist has no right to assume that a pedestrian who is walking in a place secure from danger when first seen will continue to exercise ordinary care not only in crossing a street but in continuing on his way.

A pedestrian sued a motorist to recover damages for being run down and injured by the former's automobile. It was decided that the motorist had no right to assume, as he turned down the state highway, that the pedestrian would continue in the direction he was going, unless he gave reasonable notice of his intention of going in another direction. The pedestrian was therefore allowed a judgment against the motorist.—*Lane vs. Sergeant*, 217 *Federal*, 237.

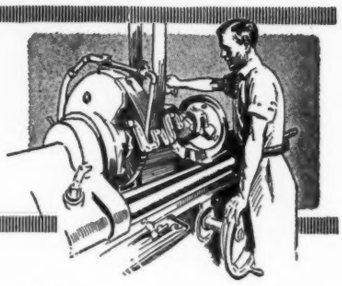
Conviction Not Proper

In a criminal action the state must show that the road where a motorist exceeded the speed limit was a "public highway."

A motorist was arrested and convicted for operating his motor car on a public road at a greater speed than 18 miles an hour. He appealed from the conviction on the ground that it had not been proved that the road upon which the automobile was running was a public highway.

The court thereupon held that his conviction was improper and must be reversed.—*Allen vs. State*, 169 *S. W.* (*Texas*) 1151.

The Rostrum



Braking with Safety

EDITOR THE AUTOMOBILE:—Putting the brakes on a car running at a speed in excess of 20 miles an hour on a slippery, hard surface, such as asphalt, is a proposition that is accompanied by so much risk that it should be dealt with effectively. While traveling down an important avenue during the last rainstorm a horse vehicle suddenly attempted to cross in front of my car. I instinctively put on the brake as hard as I could and locked the rear wheels. The result is that I transformed my car into a virtual sled and crashed sideways into the sidewalk, breaking my rear right wheel. This set my mind to work and as a result I have evolved a sand box arrangement by means of which an extra hard pressure on the foot brake trips a small trigger and releases a flow of sand in front of the rear wheels. This can be set in damp weather and the feeling of security it gives in traveling on wet pavement is remarkable.

New York City. F. K. B.

Communications

¶ The editor of the Rostrum is anxious to secure from car users and others communications dealing with the overcoming of difficulties, in making repairs and in the numberless other phases of every-day automobiling. This department is mutual and is a common ground upon which an interchange of ideas and opinions can be made as freely as in the clubroom.

¶ The ingenuity of the motorist who has his own garage and enjoys working upon his car is originally responsible for many of the improvements made by manufacturers. In fact, it is known that every maker is more than anxious to learn the opinions of the users of cars and is more than anxious to benefit from the experience gained by the mass of automobilists.

Advantages of Various Cylinder Shapes

EDITOR THE AUTOMOBILE:—Would you kindly explain the superiority and relative power of the T-head, L-head and I-head motors?

Asbury Park, N. J. H. A. STEINER.

—The advantages of T-, L- and I-head motors have been discussed at considerable length and no definite answer that has satisfied all automobile engineers has been arrived at. This is evidenced by the fact that there is a large percentage of devotees to each type. The advantages claimed for the T-head are principally in the ability to use large valves without getting too great an overall length to the motor. The valves, instead of being in one long straight line, are in two lines on each side of the cylinder. The advantage claimed for the L-head is that it needs but one camshaft, also that the number of parts in driving the valves is correspondingly cut down and a clean exterior can readily be secured with a more accessible arrangement of the auxiliaries. The advantage claimed for the I-head motor is that the combustion space can be more nearly hemispherical and hence approach what would be theoretically ideal for the elimination of heat losses through exposed surface. These sum up the principal advantages claimed for each type of cylinder, although there are many other constructional and detail questions which are also urged but which really are more a matter of individual design than of fundamental principle.

Using Crankcase Oil for Gearbox

Editor THE AUTOMOBILE:—1—Are the so-called anti-rust preparations injurious to the cooling system?

2—Would a reviver of enamel brighten up my fenders or would you advise varnish?

3—Where can I get the 1915 Blue Book for New York State? Has it been revised so as to give roads that were completed last fall?

4—I have found that the higher test gasoline I use, the more power I get and the hotter my engine gets. Will I injure my motor by using a mixture of motor and illuminating gasoline if the water circulates freely and does not boil? The dealer tells me his motor gas tests 64 and the illuminating gas 72-76 and sometimes more.

5—I have a 1913 model 25 Buick and the instructions are to use gas engine oil in the transmission. I change the oil in the crankcase about every 500 or 600 miles. Would the oil I take out be all right to use in the transmission or would it wear the gears? I use it on harvesting and sawing machinery and gas engines and it seems to lubricate.

6—Would straining it purify it or would it need to be filtered or are the lubricating properties gone?

Lebanon, N. Y. W. J. FISK.

—1—We have had no reports of where any of the preparations which are on the market that are sold especially for automobile radiators have done any harm. There are occasions, however, where boiler compounds have been used which contain corrosive substances that have acted injuriously on the radiator and water connections. For this reason before using any preparation it should be known that it is intended particularly for radiators and nothing else.

2—Varnish would probably brighten up your fenders satisfactorily. Before applying the varnish it is necessary to be particularly sure that the surface is clean and bright. The varnish then used should be the best grade of finishing varnish.

3—The Blue Books for 1915 will be published in April. They will be revised to contain all the roads finished up to the time of going to press.

4—As long as the cooling water does not boil it is certain that the motor is operating within the safe range of temperature.

5—It is a good idea to use the oil from the crankcase in the gearbox. After use for considerable time in the motor the oil takes on a gummy consistency which renders it unfit for good motor lubrication but good for use in lubricating the gears in the gearbox on account of its tendency to adhere to the gear teeth.

6—It is better to strain it for use in the gearbox.

Inquiries

¶ *The purpose of the Rostrum department is primarily to aid in the solving of motorists' problems. Readers of* THE AUTOMOBILE *are requested to allow our editorial staff aid in the solution of difficulties as they arise and perhaps through this assistance reduce the cost of upkeep of their cars and gain a useful knowledge in the economical phases of the vehicles which they use for recreation or business.*

¶ *Answers are made both through the mails and through these columns, the only requirements being that the letters are legibly written on one side of the paper, and are accompanied by the name and address of the sender in order that they may be taken care of through the mails should that be deemed advisable. A nom de plume will be used should the sender so desire.*

Principles of the High-Tension Magneto

Editor THE AUTOMOBILE:—Will you kindly explain through the Rostrum the principles upon which a high-tension magneto is constructed? I would also like to know how this differs from a low-tension magneto with which a high tension spark plug is used and also how it differs from a magneto which is used in connection with a low tension make and break system such as is commonly employed for motor boats?

New York City. M. F. B.

—The principles employed in the high-tension magneto in which a high-tension current is given by the instrument itself and the low-tension magneto in which a high-tension current is secured by an external coil, are not fundamentally different. Speaking in an elementary manner, the only difference between the two is that the high-tension instrument contains the coil within itself, while the low-tension instrument used in connection with high-tension ignition has an external coil.

With the high-tension magneto it is general practice to put the secondary winding which produces the high-tension current on the same armature upon which is located the primary winding. With the low-tension magneto using the high-tension spark system the low-tension current is produced by the primary winding on the armature of the instrument and the high-tension current is produced by an exterior step-up coil. In either case the high-tension current is induced by an abrupt interruption of the primary circuit. The phenomenon of induction is relied upon to produce the high-tension current in either case. In one make of magneto, which is really a compromise between the high- and low-tension types, the coil is not wound on the armature but is entirely separate from it and detachable. It is housed, however, in the arch of the magnets. There are other magnetos which do not carry the secondary coil upon the armature but in which the secondary winding is an integral part of the machine itself.

In the low-tension instrument used in connection with a low-tension make and break system only one winding is used with no secondary coil. The primary circuit is completed at the make-and-break mechanism in the cylinder and when the circuit is broken a small electric arc is drawn which ignites the combustible charge in the cylinders.

Spark Retarded in Overhauling Motor

Editor THE AUTOMOBILE:—I have a four-cylinder Maxwell equipped with Splitdorf magneto ignition system. The magneto is in good condition such as the points, distributer, spark levers, etc., but there seems no noticeable increase in running of the motor when you advance the spark. This car has been overhauled recently by a reliable concern. Will you kindly tell me what can be wrong with it?

Buffalo, N. Y. J. SMITH.

—Since the magneto is in good condition it would seem very possible that when the motor was overhauled and the magneto re-attached to the engine that probably an error was made in its timing. If the throttle is opened and the engine does not pick up in speed it would seem evident that the magneto had been timed very late and it is suggested that an earlier timing be given it. This can be done by advancing the magneto driving gear one or two teeth in relation to the gear which drives it. Try shifting it one tooth further forward first.

Sizes of S. A. E. Tap Drills

Editor THE AUTOMOBILE:—Will you please give me the size of tap drills for the A. L. A. M. or S. A. E. threads in 1-16 from 1-4 to 1 inch inclusive?

Jacksonville, Fla. R. A. SCHELL.

—The tap drill sizes for the S. A. E. threads from 1-4 to 1 inch inclusive by steps of 1-16 inch are given in the following table:

Sizes of Taps Threads	Drill Sizes* Inch
1-4 inch x 28	7-32
5-16 inch x 24	17-64
3-8 inch x 24	21-64
7-16 inch x 20	3-8
1-2 inch x 20	7-16
9-16 inch x 18	1-2
5-8 inch x 18	9-16
11-16 inch x 16	39-64
3-4 inch x 16	43-64
7-8 inch x 14	25-32
1 inch x 14	29-32

* Note—The tap shall be between .002 inch and .003 inch large.

Spiral Gear in M. & S. Differential

Editor THE AUTOMOBILE:—Will you please describe and illustrate with drawings the M. & S. differential?

Tifton, Ind. E. G. D.

—The M. & S. differential has spiral teeth cut in an angle of 45 degrees to take the place of the bevel pinions as used in the bevel gear differentials or spur pinions in the spur gear types. In Fig. 1 is shown the spiral gear A which fits to the inner end of each axle driveshaft. This gear meshes with two other spiral gears B placed diametrically opposite one another and besides these there is another set of these gears which mesh with a gear corresponding to the gear A but connected with the other axle driveshaft. Gears A and B are connected by two other spiral gears C placed in diametrically opposite positions with their axes at right angles to the gear B.

This practically completes the mechanical makeup of the M. & S. differential consisting of eight spirally cut gears which to again mention are located as follows: Two on the inner ends of the axle driveshafts and six in the housing which carries the large ring gear G which receives the drive from the propeller shaft. It is claimed that with the M. & S. differential the drive instead of being given through the wheel which meets with the least resistance to turning is, on the contrary, given through the gear which offers the greater resistance. For instance, if one wheel were raised on a jack and the motor was started the raised wheel would remain stationary and the power would be transmitted through the wheel on the ground.

Another feature claimed for the M. & S. differential is that in turning a corner both the inner and outer wheel aid in driving, the division of the power between the two wheels being in proportion to the distance required to be traveled by each.

A paper on the M. & S. differential was read before the Detroit Section of the Society of Automobile Engineers in September, 1913. In his explanation of the differential, W. F. Neuhl, who read the paper, said: "The two axle gears each have rotative powers through tractive distance of either

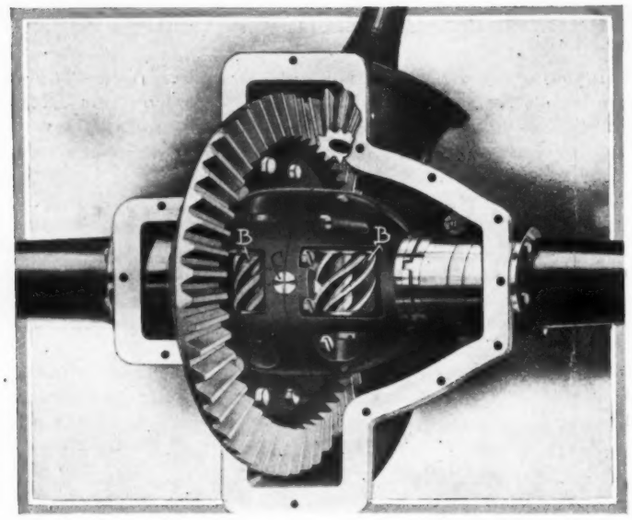


Fig. 1—View of the M. & S. differential with the differential housing cover removed

wheel, when the car is turning, or one wheel has to travel a longer distance than the other, thereby causing the six gears, namely, the four gears B and B1 and two gears C which are anchored in the gear housing to rotate on their axes, permitting one wheel to advance proportionately to the retard of the slow wheel. These gears always present the same pulling face when power is applied to the master or ring gear G regardless of differentiation; consequently equalizing power on the turn.

"On the other hand, the conventional type of differential is governed slowly by the tractive effort and distance of travel of the wheels.

"The M. & S. differential is automatic the same as the conventional bevel or spur type and operates forward or backward. The engine can be used as a brake upon the wheel with better results than it can be used on the bevel or spur types. It is standardized in size and can be adjusted to any car of any size and installed in any floating type in one hour's time."

In other words it is claimed that this differential fulfills all functions of the ordinary type and instead of driving the wheel having the least traction, that having the greatest is given the more power.

How to Preserve Chains

Editor THE AUTOMOBILE:—I found by personal experience that one set of tire chains with the right care will outlast at least two pairs without any care.

Upon examination of an old chain it will be found that all the wear and strain is on the link upon which the cross chain is fastened.

When a cross chain wears through and breaks, it will be found a good plan to fasten it to the link ahead of the one it was previously fastened to and to continue said operation until all the cross chains have been changed.

Cleveland, O. L. A. KUNZMAN.

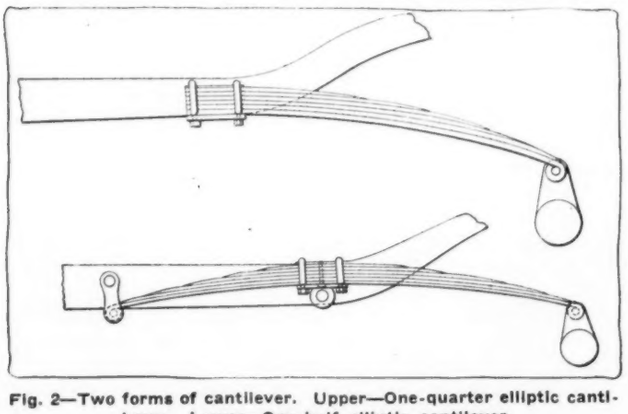


Fig. 2—Two forms of cantilever. Upper—One-quarter elliptic cantilever. Lower—One-half elliptic cantilever

Grinding Valves on Ford

Editor THE AUTOMOBILE:—1—In cranking or starting my Ford car this winter I use hot water, pouring it on the carbureter to cause the gasoline to vaporize, but when the engine starts running just one cylinder will fire, turning the engine over for 4 or 5 minutes before the others commence firing. What is the cause for this? I keep the plugs clean. Sometimes the engine will miss on high speed. The commutator was worn from lack of oil but I had a new one put on. The car has been driven 5,000 or 6,000 miles. The compression is pretty good. Do you think the valves need grinding?

2—Please describe how to grind valves on Ford cars.

3—Have also had trouble with the carbureter leaking. I have had it examined but could find nothing wrong. The repairmen ground the valves slightly with powdered glass. Also used shellac on the float, but it still leaks.

Agency, Mo. W. R. D.

—1—It is probable that the valves need grinding if they have not been ground during the 5,000 or 6,000 miles you have been driving.

2—Valves are ground in the following manner: First the valves must be removed by draining the radiator, remove the cylinder head, remove the two valve covers on the right side of the engine, raise the valve spring with the valve lifting tool and pull out the small pin under the valve spring seat. The valves can then be lifted out by the head preparatory to grinding.

In grinding use a prepared paste of ground glass and oil or some similar good compound. A convenient way to use it is to place a small amount in a flat dish adding a spoonful or two of kerosene and a few drops of lubricating oil to make a thin paste. This is then placed sparingly on the bevel seat of the valve and it is then rotated back and forth through a period of about a quarter turn with a Ford grinding tool. This operation is illustrated in Fig. 4. After this has been done a few times lift the valve slightly from the seat, change its position, and then continue the rotating motion. This is continued until the entire surface is smooth and bright. At no time should the valve be turned through a complete rotation as this is apt to cause scratches running around the entire circumference of the valve and seat. When the grinding is completed the valves should be removed from the cylinders, thoroughly washed in kerosene, and the valve seat wiped out. Extreme care should be used to see that no abrasive substance gets into the cylinder or valve guide. This can be avoided if the grinding paste is applied sparingly to the bevel face of the valve. Often as an extra precaution a ball of cotton waste about which is tied a cord to assist in its ready removal is inserted in the valve port to keep the abrasive material from entering the cylinder.

3—Regrind needle valve and replace the float.

Not Advisable to Port Cylinders

Editor THE AUTOMOBILE:—1—In timing a four-cylinder 3 3-4 by 5 1-8 motor for racing, with a quick getaway, would it be advisable to port the cylinders?

2—If so, at what point above the top of the piston when the piston is at bottom of its stroke?

3—How large should the ports be?

In order to use a large amount of oil on the bearings without having an over-supply in the combustion chamber, I cut out a section on the side of my pistons, or the skirt,

leaving 1 1-2 inch of same at the bottom. I also drilled holes in cutout section. This lightens the piston and greatly reduces friction.

Skidmore, Mo. A. L. CARTER, JR.

—1—It is no longer practice to cut auxiliary ports in the bottom of the cylinders, and it would not be advisable to alter your motor. It would mean a large expense and in all ordinary circumstances would require a considerable amount of rearrangement to take care of the waterjacketing and the arrangement of the manifold and it probably would give no material gain.

2—When it is done the top of the port is so arranged that the piston will uncover it at about the same time that the exhaust valve opens through a mechanical operation.

3—The port should be of a depth such that when the piston is at the bottom of its stroke it is on a level with the bottom of the port. As regards the amount that it extends around the cylinder this will have to depend on the total valve area that you desire and the size of the exhaust valve now in place.

Chandler Has 3.375-Inch Bore

Editor THE AUTOMOBILE:—1—The Chandler six is said to develop 35-45 horsepower. Will you kindly advise me through your columns the bore and stroke of the Chandler motor?

2—Kindly explain the method of cooling the motor.

South Euclid, O. A READER.

—1—The Chandler has a six-cylinder 3.375 by 5-inch motor. This gives an S. A. E. horsepower rating of 27.40 and a piston displacement of 268.4. Block test figures are not at present available although a maximum of 48 horsepower is claimed.

2—The motor is cooled by water, circulated by means of a pump. The pump is a centrifugal design which forces the water through the jackets and then through a honeycomb radiator.

Quarter and Semi-Elliptic Cantilevers

Editor THE AUTOMOBILE:—What is the difference in action and what advantage has one over the other, of the two illustrated types of cantilever spring construction?

Meadville, Pa. RAYMOND E. DEVORE.

—The difference between the quarter-elliptic cantilever and the semi-elliptic cantilever construction as shown in the illustrations, Fig. 2, is not so great as would be gathered from the difference in appearance. In the quarter-elliptic cantilever the entire load is taken by the short length of spring suspended at the two points. As a natural consequence this type of spring is used principally on light cars and was a common type of suspension for the cyclecar of a year ago. The semi-elliptic cantilever, on the other hand, has a three-point connection, one point at the axle and two on the frame and has a greater length of spring over which the flexure is taken. THE AUTOMOBILE published last week a discussion on the cantilever spring question which went more fully into the engineering details of this question.

Spark Advanced Too Far

Editor THE AUTOMOBILE:—I have a model 35 Studebaker and I disconnected the pump and magneto shaft in order to take up a little play and also adjusted the carbon brushes. I am getting a good spark and at the right time, but when I try to crank the motor it kicks back. Can you tell me where the trouble is likely to be?

Allston, Mass. G. A. W.

—The cause of the trouble is that the spark is advanced far enough for ordinary running but is too far for cranking. The result is that the spark occurs before the piston has reached upper dead center and the explosion, instead of forcing the motor ahead, throws it back in the reverse direction. The magneto should be so arranged that the spark occurs at full retard on exact dead center. Magnetos are generally set so that the brake in the primary braker box occurs at this point.

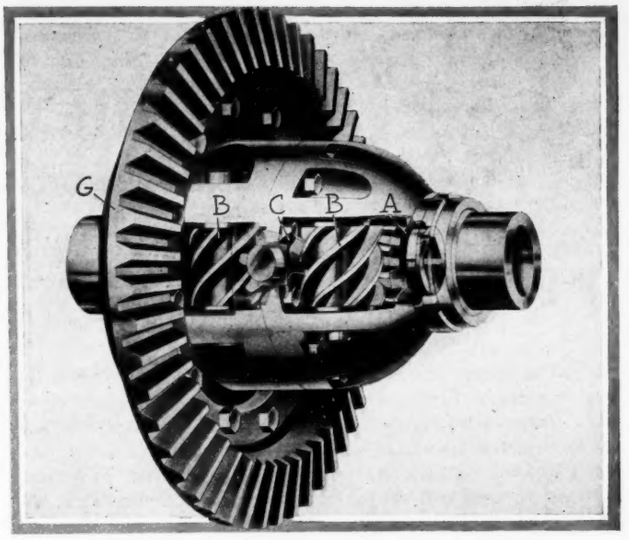


Fig. 3—Phantom view of the M. & S. differential showing the layout of the spiral gear compensating mechanism

On the model 35 Studebaker there are two methods of connecting the pump and magneto shaft, one is adjustable and the other is not. If you have a car with the adjustable coupling the timing may be altered by taking the pin from the circular flange of the coupling and shifting the coupling to retard the spark a distance of one hole on the coupling flange. If the car you have does not have the adjustable coupling you will have to disengage the timing gears and retard the magneto gear one tooth.

Loose Rings Cause Spark Trouble

Editor THE AUTOMOBILE:—We have a Ford car that misses in the front cylinder. It will run from 1 to 20 miles and then it will miss. The spark plug gets oily and will not fire. You can put in a new plug and it will do the same thing. The valves are all right. There have been new cylinders and new pistons put in the engine. It has run about 600 miles since. The ignition is all right. It has a master vibrator.

Round Lake, Minn. CLAUDE H. JENKINS.

—Evidently there is a leakage of oil due to loose fitting rings or pistons. Remove the piston and rings and examine them carefully. Replace them so that the joints of the three rings will be equally spaced around the cylinder as it is possible that they are all in line now.

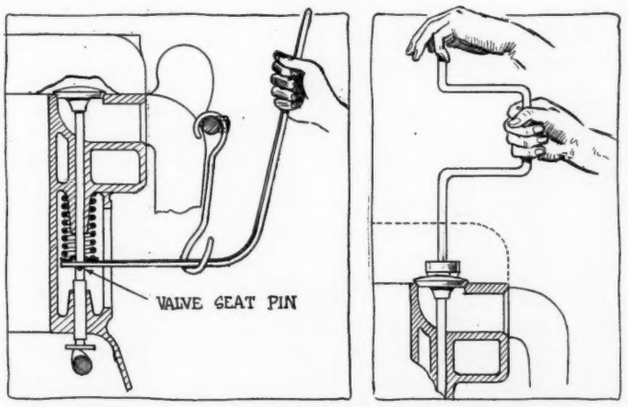


Fig. 4—Illustrating methods of removing the valve spring and grinding the valves on a model-T Ford

The Engineering Digest

Von Marchthal's System for Verifying or Replacing the Division Disks Used for Gear Cutting

SINCE it has become widely recognized that very high accuracy in the cutting of the wearing surfaces of gear teeth is indispensable for obtaining silent running and for reducing wear to a minimum, so that the silence will continue for a considerable length of time (if other provisions for this purpose are also made), the old methods for insuring this accuracy have naturally been improved, the economical pressure of series-manufacture at the same time rendering it necessary that the improvements should be simple. The division disks with graduated holes or notches commonly used for ordinary lathe and milling-machine work must now at least be made from a templet which itself has been produced under all possible guarantees of accuracy. And those manufacturers who purchase gears from specialists, if not in possession of any of the modern gear-testing machines, should have other means at their command for verifying their accuracy or inaccuracy minutely.

E. M. von Marchthal of Vienna whose patented devices in this line are largely based upon the use of steel balls as measuring units sets forth in *Werkstattstechnik* of February, 1914, the construction, uses and advantages of his system, paying special attention to their employment for verifying the divisions of pitch circle disks.

His development of the subject represents one side of the German viewpoint, according to which great accuracy in gear-cutting is a better expedient for obtaining silence and durability than the use of silent chains or roller chains, especially in connection with the careful heat treatment of the gears (to avoid slow as well as immediate distortion after quenching) which is now taken up rather widely among German automobile manufacturers. Some of the remarks and illustrations from Marchthal's article are here reproduced.

Opinions are divided as to whether the generator method or the division method gives the greater accuracy for gears, but lately the preference has swung to the division method provided the milling cutter is designed specially for the number of gear teeth wanted and the division is accurate. It is urged against the generator method that the worm mills not only are more liable to warping in the hardening than the disk cutters but also are incapable of producing a theoretically correct profile of the gear tooth, always and unavoidably leaving marks of the notches in the worm. These marks could only be avoided by having a continuous helical cutting edge, which would work as a grinder, and unfortunately no material is known which would not be rapidly worn down by such use.

Graduated division disks continue therefore to be necessary for the accurate production of gears, and they are everywhere produced either from a standard templet or directly by the use of a worm and wormwheel. And as the standard disk in the first place has been produced in the same manner, there is really only question of one production method to insure the accuracy of the graduation and that one depending upon the accuracy of the worm and wormwheel. But the production of accurate wormwheels is difficult and time-consuming, as all specialists in this line know. The use of novel machine elements is thus indicated as desirable for securing accurate graduation, and the author's patents (German 260,485 and Austrian 58,501) describe the method he has devised by making use of the very high degree of accuracy which is an accomplished industrial fact in the manufacture of steel balls.

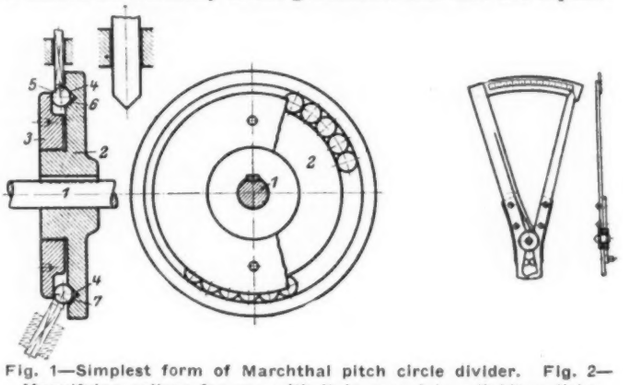


Fig. 1—Simplest form of Marchthal pitch circle divider. Fig. 2—Magnifying caliper for use with it in examining dividing-disks

The method consists in placing such balls, all true within an error of 0.001 mm., in a circle and susceptible of being reached from the outside by means of an index. Fig. 1 shows the instrument in its simplest form in face view and section.

The balls are placed in a groove 4 of the glasshard disk 2, which is mounted on the divider shaft 1, and are held close together in this groove by the hardened edge of disk 3. It may occur that the balls are found to be too loose in the

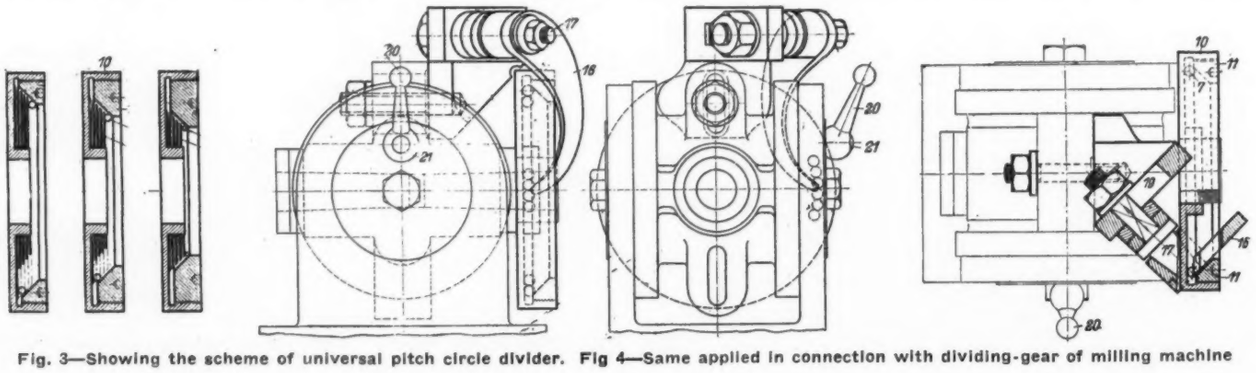


Fig. 3—Showing the scheme of universal pitch circle divider. Fig 4—Same applied in connection with dividing-gear of milling machine

groove when they are placed in it, but this can be remedied by grinding the conical surface 6 of the groove; and if such grinding were continued too long, so that there would not be room for the last ball, similar grinding of the other surface 7 would again enlarge the circle. Generally it is the best plan, however, to keep the groove so narrow that the last ball projects from 0.1 to 0.2 mm. above the rest, so as to produce a little tension in the whole circle of balls when the last one is pressed into its place by disk 3. The index can

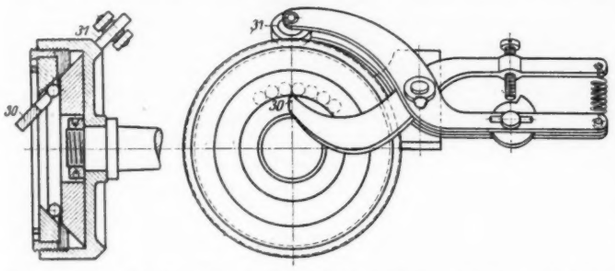


Fig. 5—Scissor-index, to obviate misalignment in shaft bearing for very fine measurements

be made as a sliding pin, as at top of Fig. 1, or as a lever and can be inserted radially or obliquely in the intervals between balls. To obtain maximum accuracy from the arrangement it is indispensable that the hardened surfaces of the groove run true to the same axis and that there be no lost motion in the bearing of the index.

In Fig. 3 there is shown a way of applying this principle for a very large number of divisions. Tension plates 11 of different dimensions are used in connection with underlaying plates and steel balls of different diameters in the same tension box. By this scheme it is possible to make all divisions from 24 to 194 with only one apparatus, using two tension plates and 7 ball sizes from 1-16 to 3-8 inch diameter. It is found in practice, however, that the use of thin multiple underlaying plates of uniform thickness leads to some inaccuracy and this feature has been dropped in favor of single underlaying plates of different thickness. Fig. 4 shows in three views the application of this universal divider in connection with a well known division gear the shaft of which can be fixed after each adjustment by means of a cam-and-lever pinching device 20, 21. In a later development the one-sided pressure resulting from a device of the same character, which was used at first, was seen to cause a small irregularity when accuracy charts were taken and was replaced by what may be termed a self-contained locking device.

A question of one-sided pressures comes up also with regard to the index, and Fig. 5 shows one shaped like a pair of scissors and provided with a roller 31 to take up the pressure of the index edge 30 upon the shaft bearing of the apparatus. As the only thing such pressure could take effect upon is the oil film in the bearing, the precaution is unnecessary, even for very accurate work, if radially acting index levers are used as by the arrangement of Fig. 1 and care is taken to have that portion of the work piece which is being worked or observed in the same radius in which the index pressure upon the balls is exerted.

While the introduction of large balls in the universal divider can be done conveniently by hand and without auxiliary tools it is advisable when the balls are small and the number of divisions large to make use of a magnet in the maner indicated in Fig. 5. Either a number of horseshoe magnets placed in the conformation of a star or a single shallow bowl magnet—26, 27 in the illustration—may be used. Its winding 25 is excited by the current from a few dry cells or from a direct-current lighting circuit. If this device is to be used, the housing 10 of the divider-disk must, however, be made of non-magnetic material, so that the balls 7 may be drawn outwardly during the tension adjustment.

The new method can be applied advantageously to the production of division sectors such as are frequently used for the milling of sector gears. Fig. 7 shows the details in elevation and cross-section. A pin at one end and a setscrew at the other form the end abutments for the ball row and a coverplate holds it down. With this form of the apparatus the ball diameter should preferably at least equal the pitch of the sector gear whose accuracy it is to control.

If the ball groove is made rectilinear there is produced a divider rule which can be used, especially with balls whose diameter represents a multiple of π, for the production of toothed racks with π pitch.

Used as a Check for Accuracy of Disks

Marchthal describes at length and with numerous curvographs the application of the device for verifying the ordinary division disks and tracing their inaccuracies to their mechanical sources, which may lie not only in unequal intervals between holes but also in slightly eccentric mounting or eccentric locating of the circle of holes. Similarly one instrument may be used for verifying another of the same kind. In instances where great accuracy is required the readings are made with the aid of a microscope. The simplest method, which is used mainly for small division disks with the holes not more than 5 to 10 mm. apart, may here be mentioned.

One of the ordinary multiplying calipers for measuring tenths of a millimeter, shown in Fig. 2, comes into service. To the short lever ends there are secured shoes which carry slightly conical pins extending at right angles with the scale plane, and the distance of the pins from the pivot of the measuring arm is made half as large as that of the measuring edge, so as to enable the operator to read 0.05 mm. directly on the scale and to estimate still smaller values.

The division disk to be examined is placed on a table and the conical pins of the instrument are successively inserted in the division holes, in which operation it is to be observed that, when the multiplying lever is at rest, the two conical

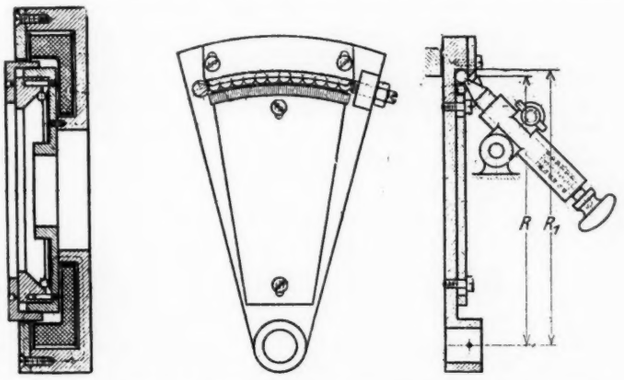


Fig. 6—Showing use of magnet in assembling the instrument
Fig. 7—Division sector for the cutting of sector gears

pins should be held at a distance from one another smaller than the interval between the holes of the division disk, so that the hand will be moved by the insertion of the pin. The overhanging portion of the scale may be held in horizontal suspension by a thread to obviate oscillations.

Among the advantages claimed for the system in its entirety are the following: (1) High accuracy at small cost, (2) suitability for industrial use, because the index can be shifted from ball to ball (unless the number of divisions is very small) and can be operated by weight or spring independently of the sense of touch of the workman, (3) durability, (4) special merits for the production of master disks by reason of the many changes of adjustment of which the instruments are capable and the use of verniers avoided.

Great Variety in Carbureters

Designs for 1915 Show No Real Changes in Principle—Minor Improvements Tend Towards Increased Efficiency—Very Few Entirely New Designs

THE ideal carbureter should supply a suitable mixture at all motor speeds and not a mixture that varies in strength irregularly. It should be readily adjustable to suit different motors, or to comply with the altered conditions of summer and winter, mountain or plain. It should be cheap to make and above all, it should get the utmost power from the least quantity of fuel and should be innocent of all waste. A little thought shows what a long road is still before the carbureter experts, but there are things that show the expert to be a good distance ahead of the average manufacturer. In the French Grand Prize race in 1913 big cars, some of them four- and some six-cylinder, covered several hundred miles at speeds between 60 and 100 miles an hour on an allowance of fuel equivalent to 14 miles per gallon. All who finished had plenty of gasoline to spare and none fell out through using up their allowance. When one reflects upon the horsepower hours that were given by the few gallons in the tanks of those cars, and compares it with the horsepower hours of work that the average car owner obtains from his gasoline it is obvious that there is nothing unreasonable in saying that there is still room for huge improvement in the fuel economy of every-day automobiles.

Carbureter Development

There have been two schools of carbureter design, the manufacturing and the scientific. Speaking generally neither has paid proper regard to the other, the manufacturer preferring to adopt haphazard methods of design and the theorist failing to allow for the limitations of practical machine work. Each have lately given way a little and, as a result, we have several carbureters in which the accuracy of workmanship approaches that of a cheap watch. Years ago when gasoline was good and of light gravity almost any sort of apparatus would produce a combustible mixture but as it becomes heavier the problems become greater. Also the small speed range of old type motors greatly simplified the conditions. Now we want high power, very slow idling and even operation over a very wide range of speed indeed. Just as the modern motor is far more complicated than its ancestor in that it has far more parts and calls for far more accurate making, so does the carbureter for it needs to be a less rudimentary sort of instrument.

Types of Carbureters

If we have a jet of known dimensions we can calculate the rate of air flow past it that will be necessary to withdraw a definite quantity of gasoline per second. Supposing that we make the size of choke tube round the jet such as to give the correctly proportioned mixture for high speed running of the motor, then we know that the jet will fail to supply enough fuel at low motor speeds and we shall have to arrange a supplemental supply from some other source. If we go the other way to work and suit the jet and its choke tube to slow running we must reduce the rate of *increase* in suction as the motor speed rises, by admitting free air through some opening other than the choke tube. If we adopt neither of these alternative schemes we can devise an apparatus to vary both jet area and choke tube area simultaneously so as to proportion the effective *size* of the carbureter to the motor demand.

There are difficulties in the way of each system, but they are mechanical difficulties and we may therefore hope that some day will see them overcome. Meanwhile it may be useful to review briefly the troubles in the application of each of the three systems, since it is far from being decided which of them will be ultimate.

Moving Part Carbureters

The system most popular in this country is the fixed jet and choke tube with a valve of sorts to weaken down the mixture as it tends to enrich with increase of motor speed, and the fundamental failing of this kind of instrument is the liability of the valve to function properly over only a small range. It is liable to act irregularly at speeds above or below a certain figure, so upsetting the mixture. Again, it is only just within manufacturing possibilities to make the valve come into action gradually enough; actually it hardly ever does so, since it cannot very well open as little as a hair wide crack and float at that on a rapidly vibrating motor. Then too, if a spring is used it is subject to vibratory oscillations and should these be created by sudden changes in the suction the valve may vibrate independently of the air flow, so disturbing the constitution of the mixture. To overcome the tendency for this action to create "dead spots" or periods of weakness in mixture at certain speeds, it is often found necessary to enrich the whole range, thereby wasting fuel and increasing carbon deposit.

All kinds of devices have been tried to overcome this failing in the air valve; there are innumerable different kinds of dashpots aimed at damping out oscillations of the valve and they have met varying degrees of success, but none of them are absolute. We have not yet seen an air valve that was completely dead beat in action. Some of the most successful types are also open to the objection that they are highly susceptible to dirt or corrosion, but as a rule the more money that can be spent upon accurate work the more nearly to perfection does the valve operate.

Carbureters without Moving Parts

The second type of carbureter is most popular for very high speed motors and has given good results on power, combined with fairly good thermal efficiency. In it there is no moving part whatever and a single jet stands in a venturi choke tube, the proportions of the jet and of the choke tube being such as to suit the high speed conditions; as suction falls off with dropping motor speed a fresh supply of fuel is introduced by supplementary means. In this kind of carbureter there is usually an additional control on the main jet by so constructing the nozzle that its natural lag is overcome. The inertia of the liquid fuel causes it to lag behind a little when suction increases suddenly and to continue flowing when suction ceases abruptly. The most successful designs have utilized the air supplied to the supplemental jet for the control of the main jet; have in effect sometimes caused the main nozzle to be a tiny carbureter within itself delivering a very rich wet gas. Some of these inertia damping devices are more successful than others but it would be hard to say that any of them are absolute.

In this kind of carbureter the supplementary supply commonly consists of both gasoline and air, the former being

drawn in most readily by low suction and the latter by strong motor demand. In other words, while air and fuel are drawn in mixed together, at low speeds, the air gradually displaces the gasoline as the suction increases, until at length there is only air passing up the supplemental nozzle into the intake.

The carbureter without moving parts is thus controlled by balancing the inertia of small columns of gasoline, the capillary action of small pipes, the effect of small orifices upon the speed of air flowing through them and the frictional drag on air passing through a small passage, against the varying motor suction, instead of balancing a spring or the weight of a valve against the suction. This makes clear why the air valve carbureter is easier to make and easier to adjust than the second sort, but it may also be noticed that the frictions and inertias involved in this instrument are each invariable, they are not liable to fluctuation in the way that a valve can be. Thus there is reason to believe that the air valve carbureter is essentially easy to set to suit a motor within certain limits, but that the other type should give better results if money is forthcoming for its manufacture and for expert adjustment to suit each individual engine.

Expanding Carbureters

The third kind of carbureter has usually a single jet, normally nearly closed by a taper needle, or metering pin, attached to an air valve so that, when the valve lifts to let in more air the pin is withdrawn so as to allow more fuel to pass. It is necessary to introduce a small passage through this valve so as to allow the jet, when at its minimum size, to feed direct to the intake for starting and idling, the valve only opening when a definite motor speed is reached. Carbureters with multiple jets operate on the same principle because they open up fresh jet and air orifices simultaneously, but they are bound to act in a series of jerks as successive jets are uncovered. This tendency can be reduced almost to vanishing point by using a sufficient number of jets, but there are severe mechanical difficulties in making a row of almost microscopic orifices, and it is undoubtedly the cost of sufficiently accurate manufacture that has prevented the expanding carbureter from coming more into favor.

Changes in New Carbureters

It can scarcely be said that much general advance has been made in carbureter design since 1913, and the reason for the introduction of several new models has been the demand for a horizontal type of instrument for attachment to block motors with a single intake port. No doubt the rise into favor of the vacuum feed will still more greatly encourage the development of this type of instrument, because a high carbureter mounting is a distinct advantage, since it makes for accessibility and also for simple and straight throttle connections.

With gasoline tending always towards a heavier gravity the necessity for a well warmed carbureter becomes increasingly apparent, so it is not surprising to find that several manufacturers have added a model with a water jacket. With a horizontal instrument mounted right against the cylinder block there is not the same need for warming as when a long intake manifold is used, but it seems hardly possible to have a carbureter too hot around the mixing chamber.

Changes made in the internal construction, though infrequent, and usually small where they are to be found, are noticeably in the direction of increase in the delicacy of the apparatus. Carbureters have simplified externally while growing more complicated inside, for reasons that have been sufficiently explained already.

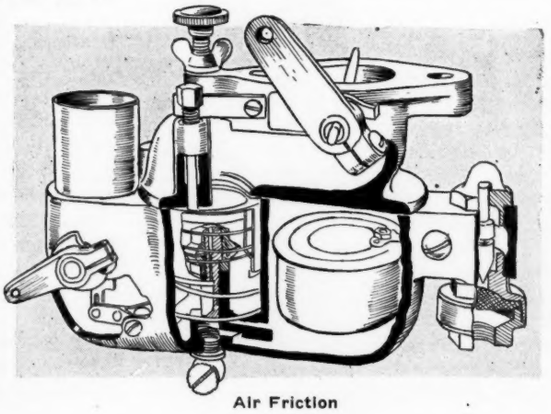
In the following descriptions no attempt has been made to classify the types, because it would require much space to do so efficiently. Some of them are quite readily recognizable in the light of the foregoing, but a good many combine the principles of two or more of the three main divisional types. To anyone who has followed the classification on the simple lines adopted above the principle of each carbureter is made clear by the brief description and by the illustration.

Air Friction Fixed Nozzle

The feature of Air Friction carbureters is the use of a mushroom-shaped valve which floats in the venturi and out of which the fuel issues through a horizontal slit in the edge.

Model C is retained with slight improvements and a new model D with a non-adjustable nozzle added. The latter is the same in principle as the former but the flow of fuel is regulated by the size of opening in a small bushing or jet in the interior of the nozzle instead of by needle valve. This device is merely for controlling the amount of flow, the spraying of the fuel in either model being accomplished by allowing it to flow through the very thin circular opening in the mushroom valve, the walls of which openings are .015 inch apart, the circumference being 3 to 6 inches, depending on the size of the carbureter.

The fuel entering the carbureter is filtered through a fine brass screen, whence it passes through the float chamber and enters the nozzle stem, whence it passes by the adjusting needle in the old carbureter, or the fixed nozzle in the new, and from thence is distributed among four lateral openings to the two horizontal surfaces mentioned. The fuel issues from these surfaces in a circular film or mist where it is taken up by the air rushing by at right angles.



Air Friction

Air Valve Surrounds Nozzle

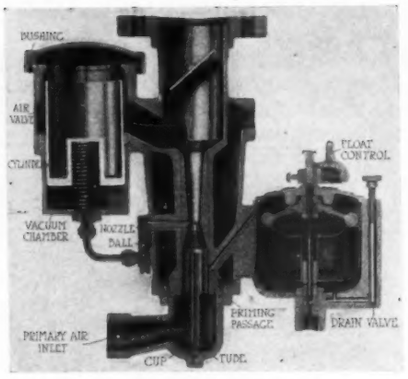
Surrounding this large circular spray nozzle is a metal air valve or sleeve, truncated at the bottom, this valve being housed in a brass liner and free to move upward. When the motor is stopped, this liner with the valve is in its adjusted position. As soon as the motor starts, the suction of the motor lifts this valve, increasing the annular opening and the flow of air.

To provide easy starting, the closing of the butterfly in the air inlet also moves the air valve down over the nozzle, reducing the annular opening to the minimum.

The air adjustment is controlled by a screw which should be raised about .2 inch from its closed position for first starting and regulated from that point after the motor has started.—Air Friction Carbureter Co., Dayton, O.

Browne—One Size for All Motors

The feature of the Browne carbureter is the vacuum-controlled auxiliary air valve the object of which is to maintain a constant ratio between the fuel and the air at all speeds and throttle openings. Only one size of carbureter is manufactured for all motors and the only change for different motors is to put in a new bushing which surrounds the auxiliary air valve and controls the area of the auxiliary air opening. Large motors use a bushing with more sharply outcurving surfaces than small motors. The same venturi construction is used regardless of the motor size. The throat area is small, insuring sufficient velocities to atomize the fuel at even the lowest speeds, it is stated. Friction at this point is reduced by giving the venturi a 30-degree approach and a 7-degree discharge.



Browne

The main air inlet is at the bottom, whence the air passes up through the venturi where it mixes with the gasoline. Additional air is supplied by the auxiliary air valve at the left, this being an aluminum piston whose position is determined by the amount of vacuum in the chamber under it. This chamber is connected with the venturi, the opening of the passage being at the same point as the spray nozzle. The result is that the vacuum acting on the fuel and on the piston valve is exactly the same, and for a definite amount of vacuum, the valve must assume a definite position; therefore, for a certain rate of fuel flow, which is determined by the vacuum, the valve must take a certain position. There is a bushing, as previously noted, with a curved surface, which surrounds the upper edge of this valve so that, as the opening of the valve increases, the area through which the auxiliary air may flow, becomes greater. The curve of this surface is so calculated that for a given position of the valve, as determined by the vacuum at the spray nozzle, the amount of air to give a correctly proportioned mixture is obtained. For a wider throttle opening the vacuum increases, the rate of fuel flow becomes greater, and the valve takes a new position. Due to the curved surface of the bushing the new area of the auxiliary valve allows enough added air to give a proper mixture, for this throttle opening.

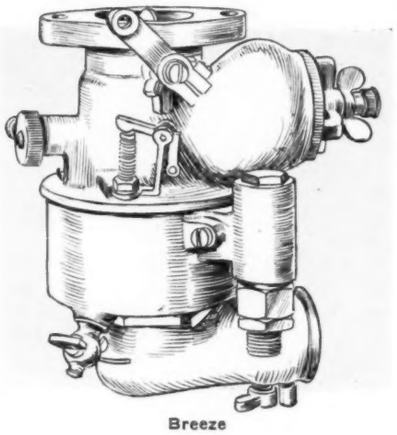
Ball Valve Stops Fluttering

Fluttering is prevented by means of a small ball which is held off of its seat slightly in the passage leading from the throat of the venturi to the air valve. When the air valve is depressed the ball offers no resistance, but when the valve attempts to close a certain resistance is interposed to prevent fluttering. This arrangement also serves another purpose since, when the throttle is closed suddenly, there is a tendency for the fuel to keep on flowing at the same rate, due to inertia. Were the air valve to close as suddenly the mixture would become too rich. The air valve is, however, retarded by the ball in the same proportion as the fuel flow is continued, thus maintaining constancy of mixture during the period. A waterjacket is fitted and the main air inlet is finished so that a hot air pipe may be attached.

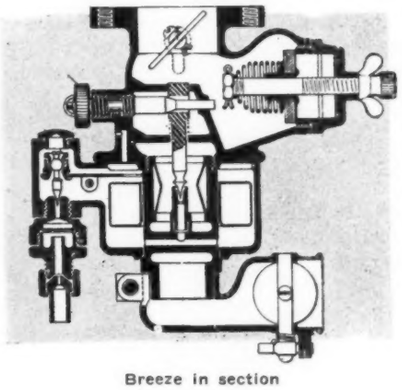
Good Accessibility

Accessibility is a feature—the carbureter may be taken entirely apart without removing it from the motor, the auxiliary valve may be lifted out after the dust cap is removed; and the float mechanism may be inspected or removed after taking off the cover to the float chamber. Dirt from the seat of the float valve may be dislodged by means of the milled head on the upper end. The fuel nozzle may be cleaned by unscrewing and withdrawing the needle valve and inserting a piece of fine wire or a hat pin. The float chamber may be drained by loosening the needle valve at the extreme right.

Priming the carbureter for starting is accomplished by pulling the lever on the top of the float chamber. This lifts the needle valve and allows gasoline to flow into the float chamber until the lever has raised sufficiently so that fuel runs down the diagonal passage into the main air passage.—Holt-Wells Co., New York City.



Breeze



Breeze in section

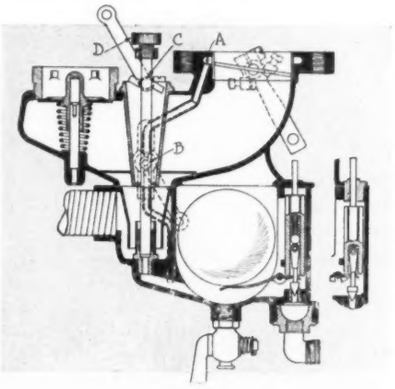
Breeze Models Simple

This is a single jet type having a large nozzle that can be adjusted by means of a vertical needle valve which fills the orifice. Instead of mounting the needle point upwards and locating the setting screw at the bottom of the carbureter in the usual way, the needle is short and hangs downward into the jet. It is suspended from a spindle which is eccentric, and this terminates in an adjusting thumb screw situated in a readily accessible position outside the mixing chamber. Turning this screw turns the eccentric and so raises or lowers the needle, which alters the effective area of the jet.

The main air is taken in at the bottom and passes up through a venturi surrounding the jet to the mixing chamber, where more air is added by a spring controlled valve, when the speed of the motor increases. Thus there are two possible adjustments, one of the fuel needle and the other the air valve spring.—Breeze Carbureter Co., Newark, N. J.

Carter Has Ball Float

The Carter is a kind of expanding carbureter since its essential feature is a vertical gasoline stand-pipe which has a series of very fine holes drilled in it in an ascending spiral. This pipe is shown at B in the illustration and the whole pipe can be unscrewed by the knurled head D. The idea of the stand-pipe nozzle is that the motor suction increasing with the speed will cause the gasoline to rise higher and higher inside the pipe, so reaching more and more of the fine holes and feeding correspondingly more freely. Air in heated state enters the pipe shown at the bottom, and passes upward; other air enters at C, where its amount is controllable by the little throttle shown, and still more air can get in through the valve on the left side, this supplementary supply passing upwards after mixing with the warmed air. Thus there is a considerable state of turbulence surrounding the spraying tube. For starting, gasoline is sucked up the passage A, from the bottom of the float chamber, and the float control has been designed with a view to keeping the level more accurately than is usual. The spherical float helps to this end and the



Carter

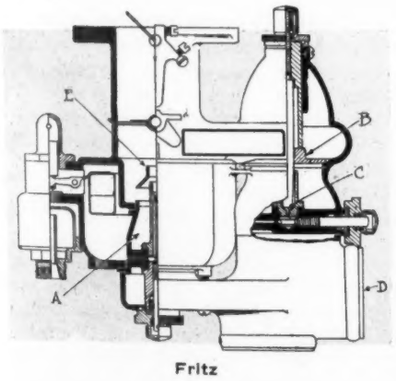
needle is so arranged that the chance of its jamming is reduced to a minimum.—Carter Carbureter Co., St. Louis, Mo.

Fritz Original in Design

The principle of the Fritz is a main jet in a choke tube A in cut, and an air valve B, which admits additional gasoline when it opens. This is done by the needle valve C, which is lifted off its seat when the air valve rises, and so allows gasoline to pass out through the little tube surrounding the needle valve. All the air enters at D, and so all air has to pass either one jet or the other. Above the main jet is the conical "hat" E, and this tends to concentrate the draught past the jet. Seen just above the main jet is a supplementary throttle which is closed for starting by a special lever and when in the position illustrated allows only a little air to pass. Putting it across the intake also opens up a passage leading to the float chamber permitting a direct spray of fuel to be inhaled. Immediately the motor is started this starting throttle is opened wide and all control is thenceforward automatic. Adjustments of a readily accessible nature are provided for all air or fuel admittance.—Fritz Carbureter Co., Norristown, Pa.

Greuter—Three in One

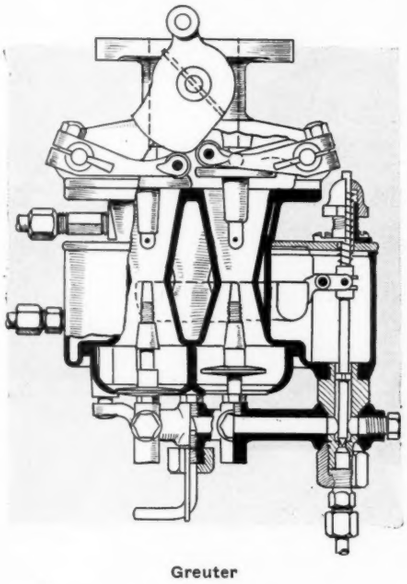
The feature of the Greuter carbureter is that it is really three carbureters in one, since there are three separate nozzles each in its own venturi tube. At slow speeds only one nozzle operates, then, as the throttle is opened the second one comes into play, and finally all three. As is shown in the accompanying section when the throttle is nearly closed and the motor is idling or running under a small load, the cam attached to the throttle butterfly shaft holds down the two levers which control the jet passages. When the throttle is opened beyond a certain point, one of these levers is released and the valve rises according to the suction. Still further movement of the throttle in the same direction sets free the other lever and the valve it controls is lifted more or less, depending on the suction of the motor.



Fritz

At the bottom of each venturi tube there is what is known as a priming disk which is for the purpose of obtaining a proper mixture when the venturi tubes are coming into action. Take for example the case of the medium speed venturi; suppose it is just coming into action. The flow of air past the nozzle is very slight and not sufficient to give a good mixture. The weight of this valve slightly resists the passing of the air, thus forming a partial vacuum and assisting the production of a mixture of proper quality. As soon as the position

Hampton Ford type

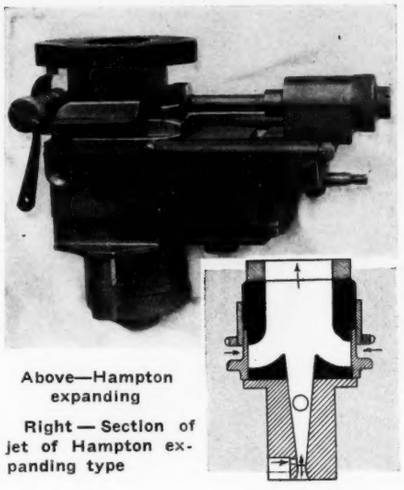


Greuter

of the throttle permits a greater quantity of air to pass through the venturi, the priming disk is sucked up against a stop collar and no longer obstructs the flow of air.—C. R. G. Mfg. Co., Long Island City, N. Y.

Hampton Makes New Models

Amongst the really new carbureters the Hampton company's products must rank prominently since they have no less than three instruments all of which are new. One is a twelve jet gasoline carbureter for which very rapid acceleration power is claimed, another is a combined kerosene and gasoline carbureter



Above—Hampton expanding

Right — Section of jet of Hampton expanding type

and the third is a simple gasoline carbureter for Fords.

In the multiple-jet carbureter, each jet has its own mixing chamber and the different jets are brought into action as the throttle is opened. A section through one mixing chamber is shown herewith and the other ten are in line with this one. The gasoline jet is not shown but it is in a member which attaches at the lower left corner of the section. There is a small air port at one side of the jet through which the air passes over the jet horizontally and a rich mixture is formed. This is carried up through the mixing chamber where it is mixed first with more air which enters from the bottom and second with auxiliary air which comes in at each side of the mixing chamber. The amount of auxiliary air is controlled by the throttle. The main air jet ports and the auxiliary air ports are shown in the accompanying illustration of the complete carbureter. Fluttering of the throttle is prevented by a dash pot control.

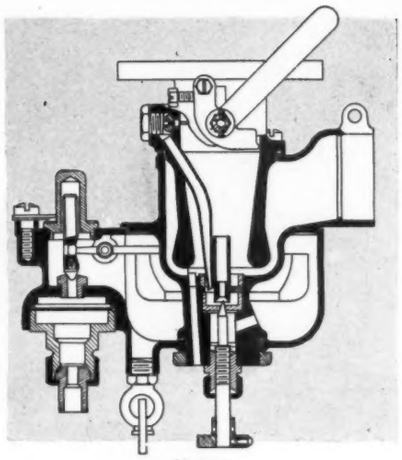
The purpose of the eleven separate carbureters is to give flexibility and maximum power. The shape of the primary air passages and the mixing chamber are so fashioned as to allow the mixture to expand, breaking the fuel into the most minute particles.

Easy starting is obtained by shutting off the auxiliary air ports, giving a very rich mixture.

There are no adjustments outside of the auxiliary air shutter which is attached to the throttle and regulates the extent to which each port is uncovered when the throttle is opened.

It is claimed that this carbureter works well on distillate and kerosene as the fuel is perfectly atomized and mixed by the primary air striking the fuel from two angles simultaneously. Each primary air opening is a small venturi in itself.

The body of the carbureter is water-jacketed, allowing the heating of the fuel and the primary air at the same time.

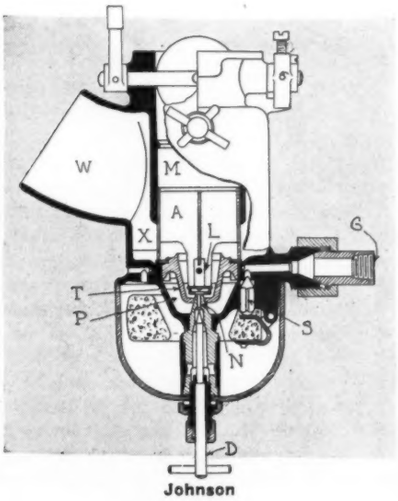


Holley

The combination carbureter is equipped with a dual float chamber, one for gasoline and the other for kerosene. The motor is started on gasoline and after becoming slightly warmed, a valve on the dash is turned, the kerosene float mechanism begins feeding and the gasoline is shut off. To aid in vaporization of the kerosene the mixing chamber is jacketed so that the exhaust gases from the motor may pass around it.

The outstanding feature of this carbureter is the method used to heat the kerosene thoroughly and insure its perfect vaporization. Instead of having a spray nozzle, the fuel passes from the float chamber to a cone-shaped passage which is just three or four thousandths of an inch in thickness. This is shown in the accompanying vertical section. The outside wall of this passage is heated to a high temperature by the exhaust heat and as the fuel strikes this wall it is quickly vaporized due to the thinness of the film of fuel as well as the intensity of the heat. The fuel is drawn up through this passage by the suction of the motor. As the speed of the motor increases, the air valve in the center is raised and more air is admitted. Due to the bevel on this valve the air strikes the film of fuel at right angles and this action assists in producing a thorough mixture. This valve is held closed when the motor is stopped by a helical spring at the bottom. The tension of this spring is adjustable and there is a dashpot on the air valve stem to prevent fluttering of the valve. There is also a needle valve controlling the size of passage from float to spraying passage and this has an adjustment which is interconnected with the throttle so that as the latter is opened the needle is raised.

The Ford carbureter is a simpler design for gasoline only. It is said that it will give more power, flexibility and economy.—Hampton Kerosene Carbureter Co., New York City.



Johnson

Little Change in Holley

The Holley is of the concentric float type with the fuel nozzle in the center of the most constricted portion of the venturi mixing chamber. Fuel flows upward past an adjustable needle valve into a little cup into which two tubes dip. One of these is the main jet and its lower end is nearly at the bottom of the cup, just above the needle valve point. The other terminates at a higher level and is carried up through the venturi to a point on the side of the carbureter body adjacent to the closing edge of the throttle disk.

With the throttle almost closed, which is its normal position at starting, the gasoline is sucked up through the long tube and past the plug at the top into the passage to the motor. This sends a rich mixture which has the effect of priming. After the motor is running beyond idling speed, the suction past the main nozzle draws the fuel up through it. This is atomized and mixed with the inrushing air in the usual way. This action exhausts the supply in the well at the bottom of the nozzle and the spraying of gasoline through the long tube ceases automatically, the motor getting its proper mixture through the main jet. Before the fuel reaches the float chamber it passes through a strainer disk shown in the illustration.

There is but one adjustment in the Holley, that of the needle valve in the nozzle.

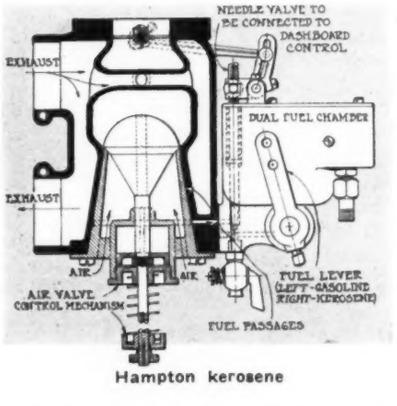
A special Holley model for Ford cars is almost identical with the standard model in design and operation, the chief differences being in the construction for giving a horizontal instead of a vertical outlet to the engine, and the needle valve is controlled from above instead of from below the main body of the carbureter.—Holley Bros. Co., Detroit, Mich.

Johnson—A New Design

The Johnson is one of the newer designs of carbureters on the market. It is made in several forms with concentric float. A special form has been brought out for Ford cars which has the motor connection horizontal, the mixing tube turning at right angles to the nozzle centerline within the body of the instrument. This has an adjustment at the top governing the height to which the sleeve can rise.

The distinguishing feature of the Johnson is the sleeve which is lifted by the suction and thus admits air through openings between the bottom of the sleeve and its seat, the amount of air varying with the height the sleeve is raised. The air supply, and therefore the mixture, is controlled automatically by the suction, which in turn, is dependent upon the throttle opening.

A section through a typical Johnson instrument of the adjustable nozzle type is shown. The carbureter consists of two compartments, the lower, the float chamber and the upper the mixing chamber. The brass sleeve A slides up and down in the mixing tube M. At its lower end this sleeve carries a small lifter plate L which extends down into the strangle tube T and over the spray nozzle N.



Hampton kerosene

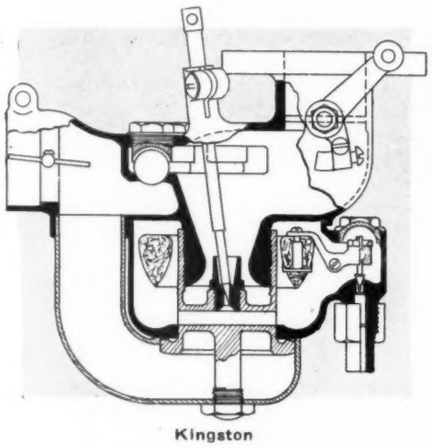
Warm air, taken from around the exhaust pipe, enters the mixing chamber at W. It then divides and some of it finds its way down under the strangle tube T through the passage P, and picks up gasoline from the nozzle. After passing the nozzle, this jet of air strikes the lifter plate L and raises sleeve A, allowing more air to pass into the mixing tube M, above the spray nozzle. This second current of air goes through the concentric passage X and the opening made by the raising of the sleeve from its seat. It mixes with the gasoline-laden current from the spray nozzle, and the whole then goes on past the throttle valve to the motor.

As the throttle is opened and the suction on the carbureter increases, the sleeve in the mixing tube rises higher, and allows more air to enter above the nozzle, thus automatically proportioning the parts of air and gasoline in the mixture. A choker is fitted which simply moves the strangle tube around so as to

open or close the ports in the carbureter body which govern the amount of air passing the nozzle. This choker connects to a dash adjustment so that the ports may be nearly closed to give a rich starting mixture. The needle D is provided with external means of adjustment so as to regulate the amount of gasoline going through the nozzle.

There are several modifications of this design, one being a fixed needle type in which case the nozzle is calibrated for the motor to which the carbureter is fitted.

Aside from its simplicity, the Johnson



Kingston

carbureter has several features in addition to those already mentioned. The flat lifter plate against which the fuel is sprayed has the added advantage, it is claimed, of serving to split the fuel up into minute particles, so aiding vaporization. The float needle valve is unusual, a square pin S bearing against the float and being therefore controlled directly by the latter. Its square form allows gasoline to flow by it when its point is off the seat.—Johnson Co., Detroit, Mich.

No New Kingston

The principle of the Kingston is very simple. Gasoline collects in the cup surrounding the point of the needle valve shown in the illustration, and air enters from around this cup. On first starting the cup is emptied quickly so giving a whiff of right gas, but the cup does not fill again unless the motor speed is reduced very greatly, gasoline being drawn past the needle valve in the usual way. For the admission of extra air there are a series of bronze balls that cover holes of different sizes. As suction increases, one after another of these balls are lifted, so letting in first a little air, and as the vacuum becomes stronger, more and more air can enter. There are no springs and no wearing parts in this system of air control which gives it the desired simple character. Only one adjustment is provided, this being the needle valve that can be set from above, and there is a throttle in the air intake for accelerating the draught at starting.—Bryne Kingston & Co., Kokomo, Ind.

Krice Carbureter Simple

In the Krice carbureter, the float chamber surrounds the mixing chamber. There are no springs, no auxiliary air inlet and but one jet. The mixture is proportioned by the shape of the air passages and for slow running and starting there is a tube which supplies a very rich mixture. Instead of a nozzle the gasoline passes through an annular opening where it is sucked up by the air. The throttle is a vertical cylinder type embracing the air passage and the mixing chamber, the whole rotating and thus simultaneously varying the opening of the air intake and discharge to the manifold. The float level is adjustable by turning a nut on the shank of the needle valve.

New Longuemare Horizontal Type

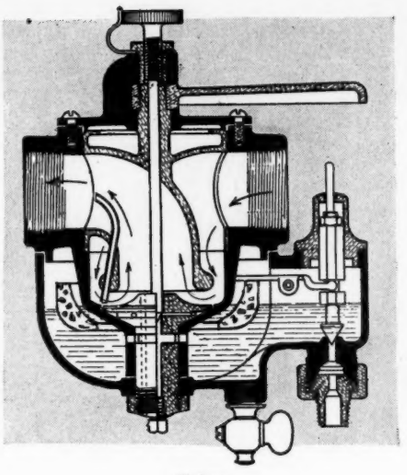
No valves are used in the Longuemare, in which mixture is proportioned by a combination of jets. New features include a horizontal type for motors with the cylinders cast in a block, and a braking attachment for use when the car is running down long hills. In addition to the horizontal model, a vertical model is continued and there is also a carbureter for small, high-speed motors of the motorcycle and cyclecar type.

The particular feature which distinguishes the Longuemare is an idling jet A which is superimposed upon a working jet B in conjunction with a compensator C. When either jet acts the other is ineffective and the transition from one to the other is imperceptible.

The operation is as follows: The fuel enters through a strainer E at the extreme upper right of the float chamber and passes by the needle valve which is controlled by the float. Thence it flows through the passage D by the adjustable needle valve which controls the opening into the passage F. The fuel also runs back into the reserve chamber C through the channel G. The fuel level in the chamber, is the same as that in the float chamber and in the working jet B.

There is a minute slit in the throttle shown at H, and when the throttle is closed this orifice lies just over the top of the jet. It can be seen that a small piece is beveled off the upper edge of the throttle and this allows anything that passes through H to be drawn up into J and so to the motor.

The nozzle of the idling jet L extends well into the strangling passage A, to the left of which there is a small air inlet M whose opening can be regulated by the ratchet locked thumb screw



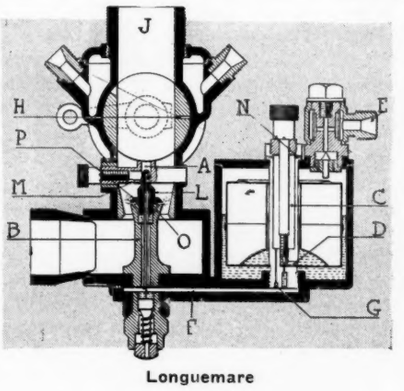
Krice

shown. Thus air can only enter the confined space around the nozzle L through M.

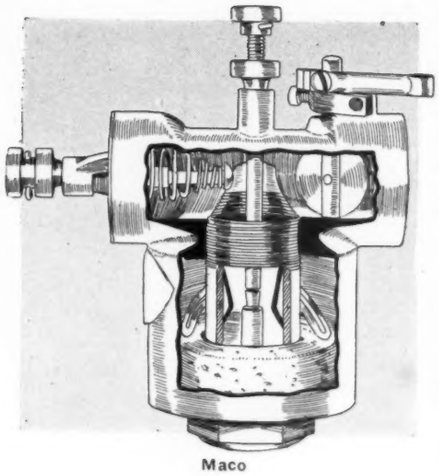
High Air Velocity When Idling

When the motor is started and run slowly in this position of the throttle it draws air with great velocity past the idling jet L and through M. The velocity past L is regulated by the thumb screw just mentioned which increases or decreases the small air by-pass M. When the throttle is opened slowly or quickly, the suction around the jet M increases rapidly but diminishes around the jet L. It is at this moment that a freer flow of fuel is always required, and to give this the compensating reserve chamber G empties into the common supply channel F. Thus the additional fuel demanded by pick up is instantly supplied. When the motor is slowed down this chamber fills to its former lever, and this reserve chamber is analogous to a storage battery floating on the line.

The natural tendency is for the mixture to become richer at higher speeds and to prevent this, when the throttle is opened the chamber C is quickly drained and exposes the orifice D to the air entering through the holes N at the top of the float chamber. This air is immediately drawn through into the channel F. Air being a lighter medium displaces the fuel passing through the channel F, and



Longuemare



Maco

retards the increasing flow from the float chamber and also aids vaporization. This saturated vapor is brought down to the proper proportion by the air entering from the main air inlet. The idling jet may be cleared of possible obstructions by a nickel steel needle operated by a push-button underneath the working jet.—The Longuemare Carbureter Co., New York City.

Maco Simple and Compact

Simplicity and compactness feature the Maco carbureter as there are but two adjustments, the gasoline for low speed and the auxiliary air for high speed. The float chamber is concentric and can be turned to any position to bring the gasoline connection to the side most convenient to the supply pipe. The spray nozzle is directly in the center of the float chamber, insuring a constant level of fuel regardless of the position of the car with respect to the horizontal.

The main air intake is at the bottom directly below the fuel nozzle. At the nozzle there is a contraction in the air passage so that the air velocity is increased and the vacuum becomes greater; these factors aiding vaporization. The auxiliary air is taken in from the side, the valve being controlled by a coil spring and the needle-valve adjustment is at the top. In adjusting the carbureter the needle valve is set to give a good low-speed mixture and then, with the spark advanced the throttle is opened wide for high speed regulation. —Gleason-Peters Air Pump Co., Brooklyn, N. Y.

No Changes in Marvel

No changes of note have been made in the Marvel. It is a double-jet type with a manually-controlled auxiliary hot air supply and a similarly controlled choker for easy starting. Two jets are used, the second jet being brought into action by the opening of the auxiliary air valve.

When the motor is idling the hinged auxiliary valve, which shuts off part of the passage, is closed thus rendering ineffective the tall jet in this part. At this time the air passes up through the small venturi surrounding the low-speed jet. As the suction of the motor increases the auxiliary valve is opened against the spring pressure and the second jet comes into action. A choke valve in the main air entrance allows a rich mixture to be obtained for starting. This device may be controlled from the dash so that when the motor is cold it may be closed when it is desired to open the throttle quickly, thus preventing a backfire.

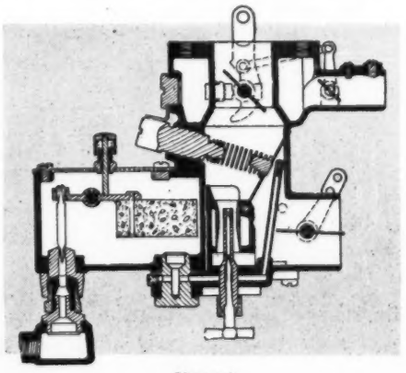
A feature of the carbureter is an exhaust heat jacket manually operated, which aids in the vaporization of the fuel. Any degree of heat may be had.—Marvel Carbureter Co., Flint, Mich.

Master Uses Many Jets

The Master carbureter remains the same in design as heretofore. It is an eccentric float type with a rotary throttle and horizontal fuel distributer extending across the air passage.

Referring to the sectional view, the fuel distributer extending across the air passage is shown at C. This has a number of small holes drilled along its length, and the lower opening H in the rotary throttle D is so shaped as to uncover more and more of these holes as the throttle is opened. At the same time, due to a similar opening H′ in the upper surface of D, an increasing amount of gas is admitted through the intake O. Thus the fuel supply is mechanically apportioned in accordance with the throttle opening. When the throttle is wide open there are no restricted passages, which is one of the points which the maker features. The air enters through the intake A and mixes with the fuel issuing from the small holes, and passes on to the engine through the openings H and H′.

The gasoline gets to the distributer through the passage P from the float chamber. A common supply tube running along the lower part of the distributer takes care of each individual distributer tube. A strainer is interposed in the passage from the float chamber. The construction of the multiple jets and of the throttle is best understood by reference to both the sectional and perspective views on opposite page.



Marvel

One Jet for Idling

When the throttle is closed, there is still one distributer hole uncovered which admits sufficient fuel for slow-speed or idling. To regulate the air supply and thus control the mixture, the air damper B is placed in the air passage. This is simply a flat piece of metal arranged to swing about its base so as to shut off any part of the air. As shown, it is set for a rich mixture, whereas, if partly open, the proportion of air would be greater.

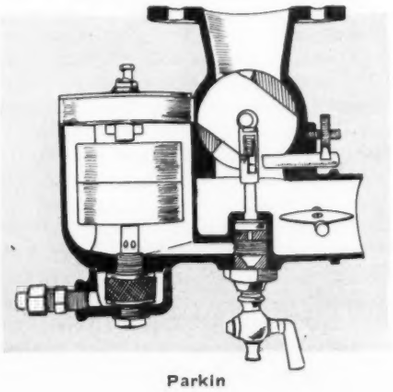
Distributers of different capacities are available for fitting to the various sizes of carbureters. Wear of the rotary throttle is minimized, for it does not touch the throttle chamber in which it operates. It has large journal bearings in the mixing chamber body. The air damper is controlled from the dash.—Master Carbureter Corp., Detroit, Mich.

M. F. Carbureter Is Floatless

This is a carbureter of unusual design in that the float-chamber has been discarded, and it is also remarkably simple and light. The main air inlet is at the bottom and to one side. At slow speed the air rushes up through this passageway, past the spray nozzle, lifting a small disk to which is attached the needle-valve extending into the nozzle and controlling the flow of fuel. The higher the disk and needle are raised the more fuel flows out. These two members are held down by a flat spring whose tension may be adjusted by means of a thumb screw at one side.

For starting a very rich mixture may be secured by rotating the eccentric which raises the flat spring and the needle valve, thereby allowing a large flow of raw gasoline.

At high speed the additional suction raises the auxiliary air valve from its seat, thus allowing more air to flow to the motor. This valve is seated by a helical spring, whose tension is adjust-



Parkin

able by a thumb screw.—Floatless Carbureter Co., Brooklyn, N. Y.

Newcomb Adds Water Jacket

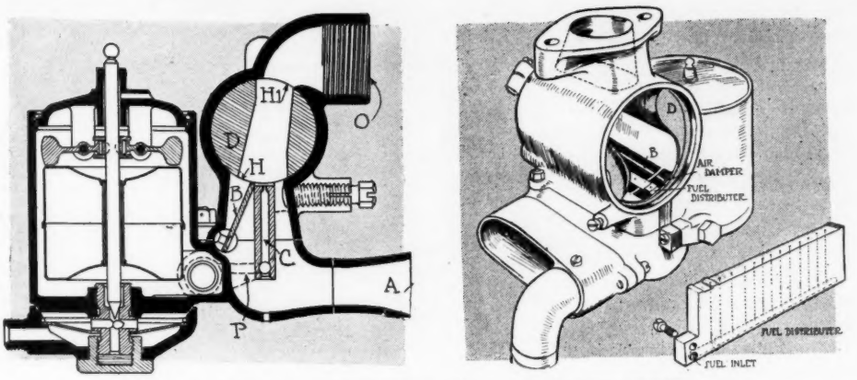
A line of water-jacketed carbureters is the new feature of the Newcomb production, all previous models having been built without water-jackets, except the .75-inch size. All water-jacketed models have been carried over with few changes, and in addition these particular models can now be procured in aluminum as well as bronze. The carbureter is called a constant-vacuum type because it automatically enlarges the effective air and fuel openings in direct proportion to each other and to the demands on the carbureter for an explosive mixture.

The metering mechanism is located in the vaporizing chamber. It consists of a hollow plunger surrounding the fuel nozzle tube, a sharply pointed needle valve is attached to the upper part of this plunger and controls the flow of the fuel. Around the bottom edge of the plunger a large number of small holes are drilled and these are arranged to register with an equal number of slots cut in the plunger tube, or cylinder, to distribute the fuel after it has issued from the main fuel-measuring orifice. The plunger is seated on the regulating collar, indicated in the illustration, when the motor is not running. The office of this collar is to withdraw the fuel needle from its closed position by raising the plunger without uncovering the air slots in the plunger chamber. The opening of the fuel port is thus given a lead with respect to the air ports, delivering a rich mixture when the plunger is raised but a trifle, as when the motor is idle.

How Air Is Proportioned

When air is drawn through the carbureter, the plunger lifts in proportion to the amount of air entering the motor. The needle in the nozzle lifts at the same time, releasing the amount of gasoline needed to correctly charge the entering air—the higher the plunger is lifted the larger the air and fuel openings. The effective areas of the air and fuel ports are at all positions so proportioned that the fuel mixture is correct for all rates of flow. As the fuel flows through the small holes it is caught by jets of air coming through the slots and is atomized thoroughly on account of the high velocity of the air. Any fuel unvaporized is gasified when it strikes the heated walls.

A dash-pot is formed between the head of the plunger and the upper end of the plunger chamber. This retards the lifting speed and allows a richer mixture when the throttle is opened suddenly—the motor may be run on a thin mixture and still pick up quickly.

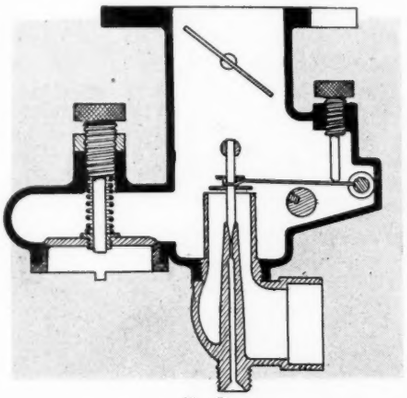


Left is view of Master in section. Right shows nozzles

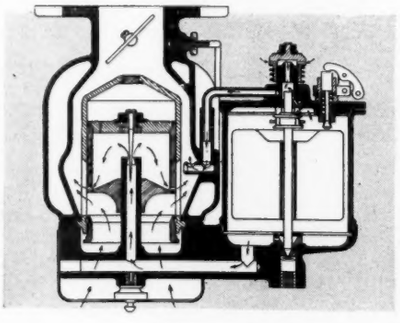
Mixture adjustment is effected by means of a pointer traversing a graduated arc etched on the top of the float chamber. This pointer adjusts the degree of vacuum above the gasoline in the float chamber and partially restrains the flow of fuel from the nozzle.

Easy Starting

For easy starting in cold weather an auxiliary fuel nozzle is provided which consists of a tube conveying gasoline from the float chamber to the small orifice just under the throttle valve. Normally, this orifice is subjected to the constant suction of the motor, whatever this may be, and the bore of this orifice is so proportioned that very little fuel flows through it to the mixing chamber under these conditions; but when it is desired to start, the throttle valve is turned backward through a slight angle bringing the orifice above the valve and subjecting it to a powerful suction.—Holtzer Cabot Electric Co., Brookline, Mass.



M. F.



Newcomb

Parkin Carbureter without Springs

This carbureter has no springs in its construction and there is but one air inlet. The mixture is controlled by a special type of throttle valve and a single large jet whose area of opening is varied by the position of the throttle.

The cylindrical throttle has a double function, the upper part is the throttle proper, and the lower part is what is termed the variable-air shutter. This lower member controls the amount of air which passes the jet by varying the area of the passageway. The rotation of the throttle also controls the opening of the single jet, which is a large hole in the side of the jet tube. Over this tube is a double sleeve, the inner portion of which moves down over the jet opening as the throttle is closed. This movement is produced by an eccentric on the throttle which bears on the top of the sleeve. Easy starting is provided by means of a choke valve in the air intake and dust is prevented from entering the float chamber by means of a screen.—Light Mfg. & Fdry. Co., Pottstown, Pa.

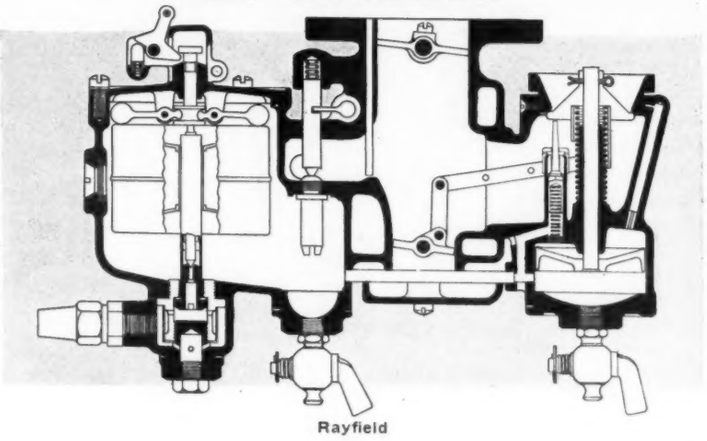
Rayfield Makes Two Models

Rayfield carbureters are made in two types for the coming season, the difference being that one has a water-jacket. In both models the air valve adjustment has been eliminated, high and low-speed adjustments being through the control of the fuel. Both models are of the two-jet type, one jet feeding at low-speed and both at high-speed. There are three air openings, one fixed and operating in conjunction with the low-speed nozzle and the other two having automatic valves linked together and operating simultaneously.

The high-speed nozzle is controlled by a metering pin actuated by the upper automatic air valve. The stem of the valve is connected to a piston working

in the dash-pot, the passage communicating with the float chamber; the dash-pot chamber has direct connection with the high-speed nozzle.

When the throttle is opened the tendency of the air valve to open suddenly and excessively, and to flutter, is checked by the dash-pot piston, which at the same time forces an extra supply of fuel into the nozzle and enriches the mixture for starting; the slow opening of the air valve helps by causing strong suction on the nozzles. These two carbureters are made in five sizes, the 1-inch being recommended for motors of 4-inch bore and either four or six cylinders.—Findeisen & Kropf Mfg. Co., Chicago, Ill.



Rayfield

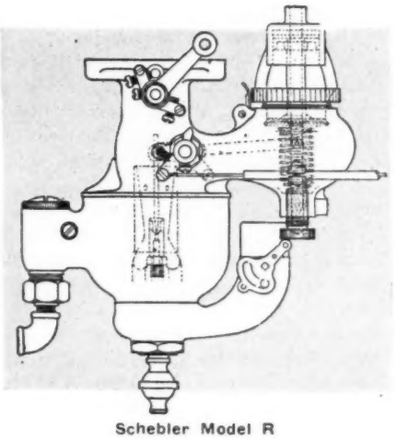
Schebler Product Unchanged

The two well-known Schebler models will be continued without change for 1915. Model L has a single jet, an automatic air valve and a cam which raises the needle valve as the throttle opens, the latter being adjustable for varying the lift at different throttle openings. Model R is an improvement on the L and has a single jet, but the needle valve is inter-connected with the automatic air valve and its opening increases with that of the fuel valve. A dash-controlled eccentric acting on the needle valve and working in conjunction with a choker in the air intake gives a rich mixture for starting. Both models are suitable for four and six-cylinder motors and are equally adapted for pleasure cars or trucks. No water jackets are used, but hot air connections are furnished for a small extra charge. A dashboard, or steering column adjusting device, is obtainable for model R.

Special outfits are made for 1910-1911-1912 Flanders cars, including 1-inch Model R carbureter, manifold, steering column control, hot-air drum and tubing, gasoline connection and throttle rod, as a complete set. The makers recommend a 1-inch carbureter for a motor of from 15 to 22 horsepower; 1.25 for 22 to 25 horsepower; 1.5 for 35 to 40 horsepower and 1.75 and 2-inch carbureters for 40 to 70 horsepower.—Wheeler & Schebler Mfg. Co., Indianapolis, Ind.

Shakespeare Springless

This has no springs in its construction and the gasoline and air are regulated together by means of a mushroom valve that lifts a metering pin out from the main jet nozzle as it rises. In the illustrations the valve is seen in the position it would take when the motor is not running.



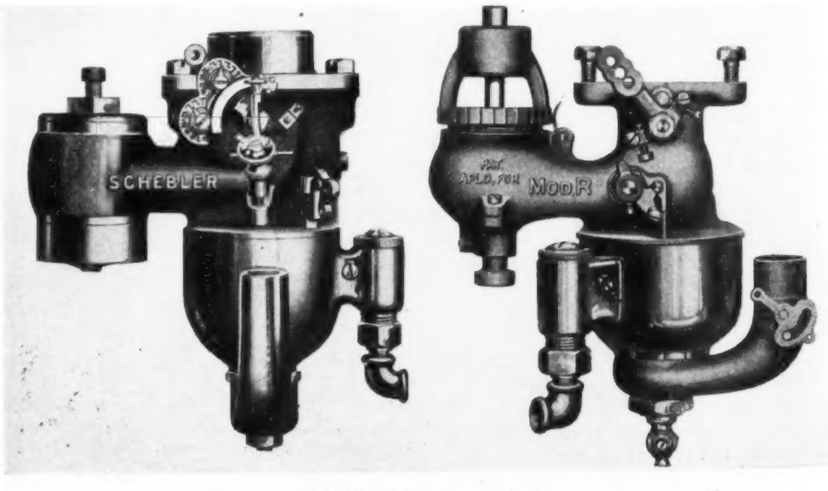
Schebler Model R

The air flows in from an intake at the side of the carbureter and then down under the mixing chamber. Part of this air enters the base of the venturi tube, where it sucks up gasoline, thus forming a very rich mixture which passes out through a narrow circular passage in the valve. The thinness of this passage helps to break up the fuel and to mix it thoroughly. As the suction of the motor increases this valve A is raised, more fuel flows from the nozzle and at the same time the higher position of the valve allows more air to flow around this valve, so that at full throttle opening a large amount of air flows to the motor without passing through the venturi, but this air is mixed with the very rich mixture of gasoline and air which is produced by the air that flows through the venturi tube. Since the flow of mixture as it leaves the valve is at right angles to the passage of the auxiliary air, the two columns are thoroughly mixed when they come together, thus insuring homogeneity and perfect vaporization.—William Shakespeare, Jr., Co., Kalamazoo, Mich.

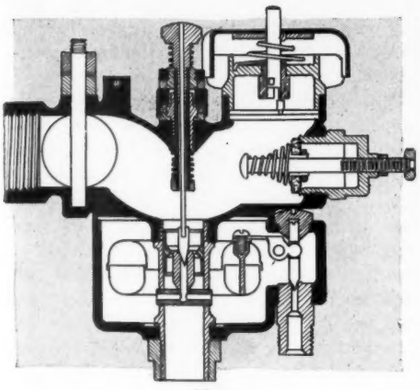
Siro Adds Starting Device

Siro carbureters are made in seven sizes, varying from .75 inch to 2 inches. Few changes have been made for the coming season, the most important being the addition of a device for easy cranking. This consists of a valve that shuts off the main air and enriches the mixture. Hot air pipes are furnished for all models. There are two auxiliary air valves and an adjustable needle valve. The mixing chamber is U-shaped, the throttle valve being at one end and a mechanically operated auxiliary air valve at the other. These valves are so arranged that when the throttle is opened the auxiliary valve opens in exact proportion to it. At the bottom of the U is an initial air tube concentric with the float chamber and in the center of it is the fuel nozzle.

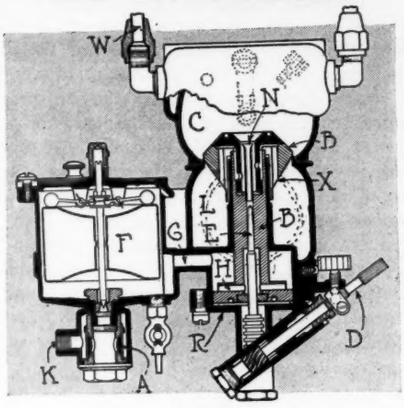
The construction of the needle valve is such that it is connected with the throttle and auxiliary air valve and when the throttle is opened or closed the auxiliary air valve as well as the needle valve opens or closes proportionately.



Schebler Types L and R



Siro



Stewart

The movement of the needle is effected by a cam. The float is of spun copper, made in two pieces and carefully soldered together.—Siro Carbureter Mfg. Co., Northampton, Mass.

Stewart with New Dash Control

There is a new design Stewart which differs from those types which it supersedes only in some constructional details, the principle and operation being identical with that of all Stewarts. The operation depends upon a metering pin and valve, the two working in unison to automatically measure the amount of air and gasoline that enter the mixing chamber.

The main change in the new model is in the dash control D, shown in the sectional view. This is placed at an angle instead of being horizontal, and has the advantage of easy installation, doing away with the need of universal joints or flexible couplings.

With the exception of the float mechanism, the Stewart carbureter has but one moving part, the metering valve B, which may be taken apart and cleaned without disturbing the adjustment. It goes down over the taper pin E, and, when not operating, seats on the bottom R of the dash-pot. It is in its idle position in the cut.

Gasoline flows from the float chamber through the connection G and the holes H in the lower part of the metering valve into the well around the taper pin E. When the carbureter is at rest a small amount of fuel collects in this well. When the engine starts this is pulled up into the mixing chamber C, and gives a rich starting mixture. As the motor picks up a partial vacuum or suction is created above the metering valve B in the chamber C. This causes B to lift from its seat and to permit air to pass from the chamber L into chamber C. Since pin E is tapered, the more B is raised the greater the opening around E and the more fuel can flow. The height B is raised is, of course, dependent upon the suction, which in turn is in proportion to the engine speed. Therefore, as the suction varies, the height of the metering valve varies, and the volume of air and the amount of gasoline admitted to the mixing chamber must increase or decrease in the same ratio.—Detroit Lubricator Co., Detroit, Mich.

New Type Stromberg

An entirely new design is the leading feature of the Stromberg program, this having but a single jet instead of the two nozzles customary in Stromberg practice. One of the basic ideas of the Stromberg designs is the use of a long venturi tube, the idea being that this extra length steadies the flow of air in the venturi, and prevents any disturbance in the action of the jet, which might be caused by eddy currents produced upon the opening of the air valve. Furthermore, the vortex created by the air currents swirling around the upper end of the venturi actually tends to increase the flow past the jet. Thus in the two jet horizontal model the venturi is extended well up into the main passage, and in the new type it is even longer proportionally, coming actually above the junction of the air valve chamber with the main body.

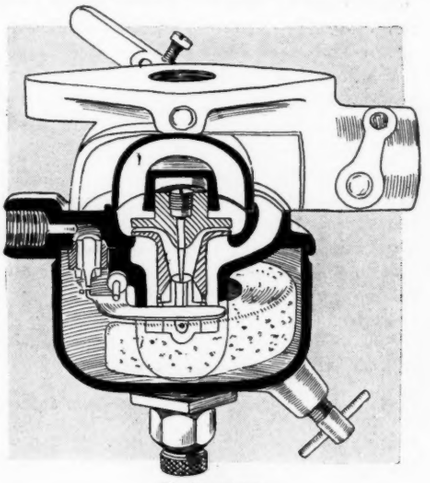
This single jet instrument operates as follows: The air valve opens downwards and in a direction opposite to the incoming air. To the upper end of the air valve spindle the piston A is attached and this piston slides smoothly in its casing, there being holes through the top so as to free the upper side of A to the atmosphere. If, owing to suction of the motor, the air pressure in C drops below atmospheric, then as the area of piston A is greater than the area of the valve proper, the atmosphere acting on A overcomes the atmospheric pressure on the valve, and the latter is opened. Air passes under the venturi and up past the jet all the time, the suction in the venturi being roughly proportional to engine speed so that more gasoline is forthcoming as the motor's demands for mixture increase.—Stromberg Motor Devices Co., Chicago, Ill.

Sunderman Is Simple

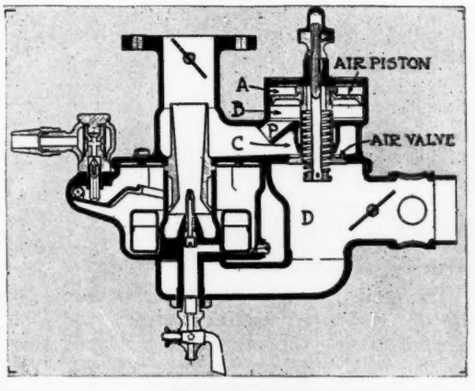
The special feature of the Sunderman is the use of a very wide mixing chamber, having a disk of finely perforated metal spread across it, this plate being of inverted saucer shape. The main air passes up a small venturi and there is a plain jet adjustable by a needle valve. The top of the venturi acts as a guide for a large mushroom valve that permits air to be taken straight into the mixing chamber when the suction is sufficiently strong, and the jet needle being attached to this valve causes the fuel supply to increase with that of the air—Sunderman Safety Carbureter Corp., Newburgh, N. Y.

Webber in One Model

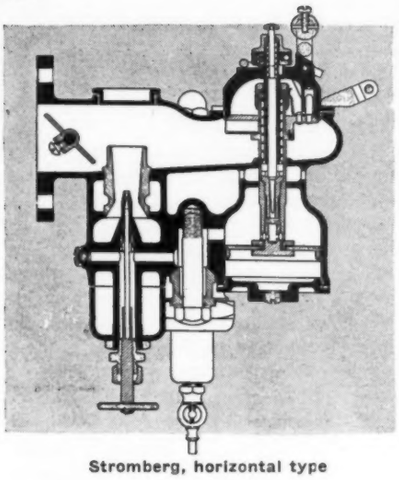
This is a vertical type and has a single jet opening into a strangling tube, surrounded by a float chamber. Directly above the nozzle is a conical valve controlling the fuel opening, a finger resting on the valve being linked to the auxiliary air valve. Normally the fuel valve is closed by a spring, but the opening of the air valve permits the fuel valve to open also. The air valve stem



Shakespeare



New Stromberg



Stromberg, horizontal type

is extended upward and carries a piston working in a cylinder to prevent fluttering. The use of an auxiliary air valve makes it possible to keep the fixed air opening of small size, so that a rich mixture for starting and low speeds is automatically secured.—Webber Mfg. Co., 66 Stanhope street, Boston, Mass.

Zenith Adds Models

In addition to its two standard models, the Zenith Carbureter Co. has added several new types for 1915, one built more particularly for the small car trade and sold at a lower price than the other models, though retaining the standard Zenith features, and a carbureter for eight-cylinder motors has also been developed.

The upright model is the standard Zenith carbureter and another is the horizontal type especially adaptable to block-cast engines which have a type of gasoline feed allowing the carbureter to be mounted high upon the side of the cylinder.

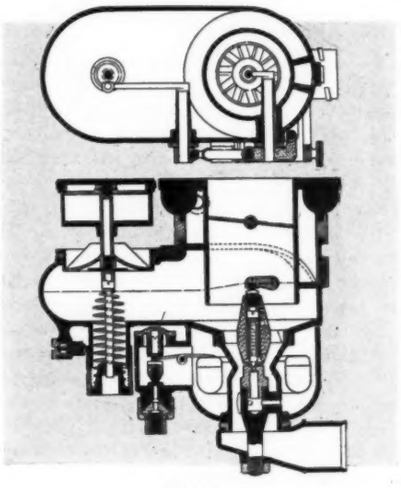
The Zenith principle is a compound compensating nozzle arrangement which is claimed to give a constant ratio of air to gasoline at all motor speeds. The main fuel jet, which is fed directly from the float chamber, is surrounded by the auxiliary jet H, giving rise to the compound construction. The outer jet connects through a small tube K to an orifice T in communication with the float chamber. The supply of fuel in this tube is constant so far as the level in the float chamber is constant, for it depends upon that level for its own height. Thus the supply of fuel given to the outer jet does not increase or diminish with the variation in the suction due to the air passing through the venturi tube.

Main Jet Size Varies

The main jet action is similar to that of any carbureter having one jet, the amount flowing through it being in proportion to the throttle opening which governs the suction. The main jet is furnished in different sizes, that size being used on any particular motor which is shown on trial to give best results.

Naturally, the greater the throttle opening the greater the tendency is to lower the fuel level in the supply chamber, with consequent decrease in the amount of gasoline passing through the outer jet. At the same time the main inner jet acts in the opposite way and gets greater supply and thus the combination serves to compensate for all speeds and give a constant ratio of fuel to air, due to the two jets acting in diametrically opposite direction.

In the Zenith carbureter design there is really a third auxiliary jet, which comes into action only for starting or for slow running. This jet is in a tube which is a part of the mixing chamber, and it opens into the passage to the motor just above the throttle valve. When the throttle is only slightly opened at times of starting, a strong suction is



Webber

created at the point P, where this third nozzle enters the gas passage and this draws pure gasoline from the well at the bottom of the auxiliary tube, which mixes with the inrushing gases, enriching them as they pass to the motor. When the engine is running very slowly the suction in the venturi tube at the main jets is very low and insufficient to draw enough fuel for proper mixture. The fuel will then rise in the auxiliary tube and will finally pass through the opening at the throttle edge to sufficiently charge the gases.

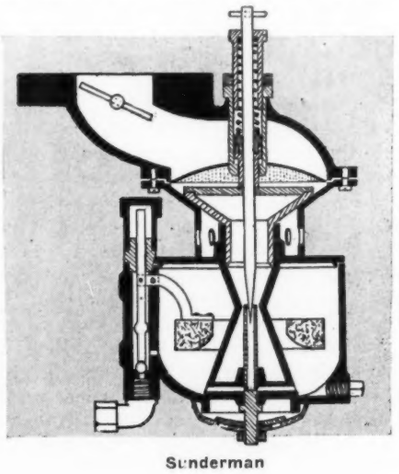
Once the proper nozzle size is determined, it will be noticed that there is no adjustment to the carbureter. For spraying the gasoline used in the starting jet air is admitted to the outer part by the adjustable screw O. This air passes down to the bottom of the jet and is drawn up to P in conjunction with the gasoline. The amount of air let in at O decides the idling speed and ease of starting. The horizontal Zenith is the same in principle as the others, only the mixing chamber is at right angles to the compound jet rather than being concentric with it.

The special duplex model Zenith for eight-cylinder motors was described fully last week, so it is only necessary to add here that it follows the ordinary Zenith principle of operation, but has two jets with the slow-running fittings and two mixing chambers. There is a single float chamber situated between the two horizontal type mixing chambers, and the two throttles are interconnected so that a single attachment to the control suffices. The compound carbureter fits snugly between the two cylinder blocks of a Vee eight motor, and the use of duplex parts reduces the task of tuning up the motor to the same simplicity as with a four cylinder.—Zenith Carbureter Co., Detroit, Mich.

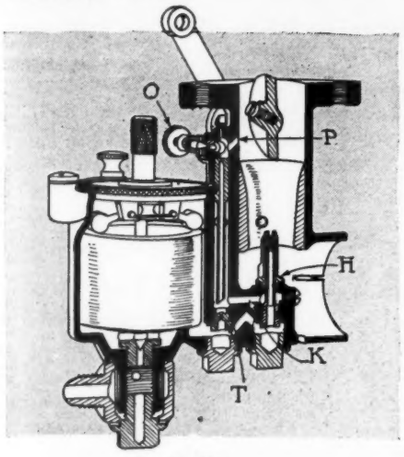
Zephyr Springless

The Zephyr carbureter is a type of instrument in which there are no moving parts. The suction is depended upon to draw the fuel through jets of predetermined size. The main features are the low and the high speed jets. In the sectional view, a form of Zephyr instrument with vertical venturi is shown. When the throttle valve T is open air passes up through the main air intake E, and the greatest suction is created at the point where the venturi reaches its smallest diameter. This is where the main jet J is located. Thus the fuel is sucked up from the float chamber through the passage X and sprayed through the atomizer M into the current of air flowing in through jet tube J. This breaks up the fuel at the point of union, and the whole mixes with the main current of air at the throat of the venturi tube.

When throttle valve T' is closed the low speed jet J1 comes into action. The majority of the atomized fuel formed at M in the main jet then is drawn up through the passage Y through a hole in the main jet tube. This is sprayed



Sunderman



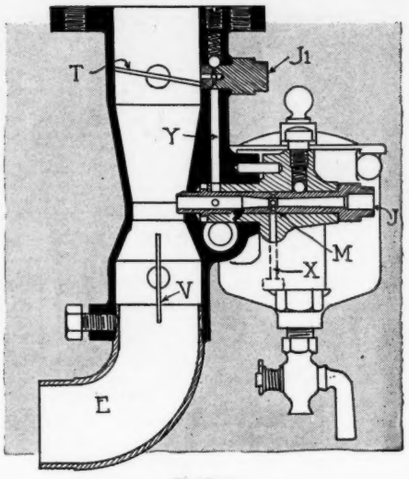
Zenith

through the slow speed jet directly into carbureter tube on the motor side of the throttle valve. This sends a rich mixture to the motor which would otherwise get only a very lean mixture, due to the small amount of air passing through the main passage and past the main nozzle through which only a small amount of fuel is issuing into the main passage.

Jet Adjustment

In order to adjust the carbureter for low and high speed running, the main jet tube J and the throttling tube J′ are each provided with four jets of varying sizes which are at right angles to each other around the jet tube. Only the bottom jet, however, is operative, as it is the only one that can register with the fuel passage X or Y as the case may be. Any one of the four jets can be brought into this position over the passage, as the tubes can be rotated from their squared outer ends. Spring-engaged ball-locks seating in indentations in the tubes normally hold the tubes against rotation and also position them so that the jet desired is in register with its tube. Each of the flat faces of the squared outer end is numbered so that the adjuster can tell what one is in position. Jet tubes having different series of jets can be had thus widening the range of adjustment.

For starting, the shutter V in the main air passage can be closed. This shuts off the main air supply and a strong suction on the throttling jet sends a rich mixture to the engine. The cover for the float chamber is so attached that it may be turned to one side in order to expose the float mechanism and thus inspect the float action even when the engine is running. By removing a cotter pin which retains the float lever hinge



Zephyr

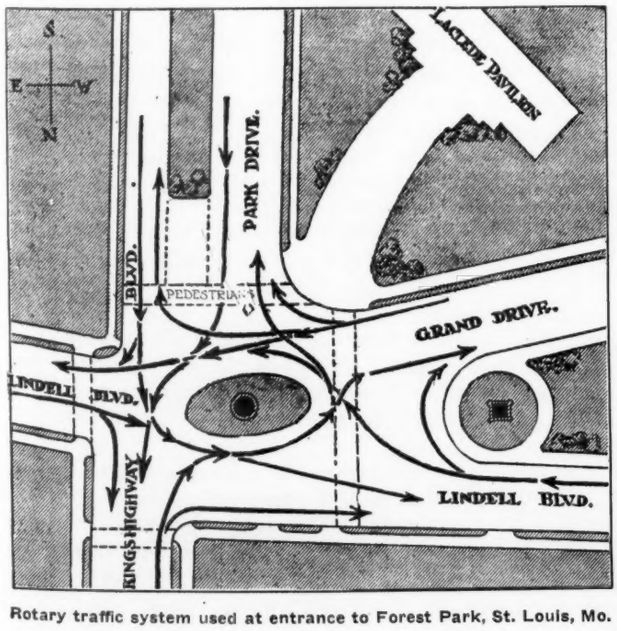
pin in place, the whole float mechanism can be removed for cleaning or inspection, in most cases without stopping the motor, it is said. A groove cast in the inside of the fuel chamber shows the highest permissable level. Zephyrs are furnished with the venturi tube arranged either horizontally or vertically, and the design also permits of a number of positions of the float chamber with respect to the main body of the instrument.—George A. Breeze, Detroit, Mich.

Rotary Traffic System in Force in St. Louis

ST. LOUIS, MO., Jan. 30—The rotary traffic system at the Lindell entrance to Forest Park has now been in effect for 2 months. The new system, which is designed to lessen the possibility of automobile accidents, is in force from 7 o'clock each morning until 6 at night.

Under the system the traffic moves in an oval around a large lamp pole on the west side of Kingshighway, a north and south street, and Lindell boulevard, an east and west lane, which heretofore has been the traffic pole. All vehicle traffic must pass to the right. A new set of traffic rules as laid down by the park commissioner follows:

"Keep to the right. Drive slowly. Don't get excited and kill your engine. Pedestrians must cross at safety zone. Every vehicle must enter into the line of traffic around the circle and move in the prevailing direction. Traffic around this circle may go in double or triple lines. Northbound vehicles on Kingshighway must go to the right of the traffic officers. Westbound vehicles desiring to enter the park must keep close to the drawn circle. Through eastbound traffic on Lindell boulevard must go around the circle, as is the case with vehicles desiring to go south on Kingshighway. Vehicles wishing to go north on Kingshighway must go to the right of the traffic officers."



Rotary traffic system used at entrance to Forest Park, St. Louis, Mo.

It is the plan of the park and street commissioners to paint white lines across the boulevards at the street intersections hence pedestrians who heretofore have cut across the park entrance in a haphazard way will be required to stay within the denoted lines. Thus the traffic of the pedestrians will be centered in a definite area so that the motorists will know where to find the pedestrians and vice versa.

The distances across the park entrances are 230 feet and 175 feet. The new plan requires pedestrians to walk only 36 feet from one safety zone to another. It also reduces the collision points where traffic lines going in opposite directions cross, from 120 to six.

The entrance to Forest Park always has been considered the most difficult traffic problem in St. Louis. Six traffic policemen formerly stood on duty here, but with the new rules three will see that the recent regulations are enforced. Signs will direct the drivers.

The Automobile

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Carburetion

IT would seem sufficiently easy to make a good combustible gas from gasoline and air, but the immense number of designs for carbureters shows that it is in reality quite difficult to make such gas under the conditions prevailing on an automobile. There is a greater variety of feature between carbureters than between motors, transmissions or even magnetos. The very electric generators and cranking motors show less difference in detail than can be found among any half dozen carbureters, and this is the more amazing because the carbureter is the most essential portion of the chassis. Without a carbureter the finest automobile ever constructed is merely a beautiful exhibit of workmanship; it is as useless as a steamship with no boilers. It would be rational to expect 10 years and more of earnest endeavor to bring one nearer to finality, nearer to a standardized idea, than the carbureter manufacturers have been able to do. That it has not been possible to come to agreement concerning more than a few fundamental points shows that we may still hope for a far greater carbureter efficiency. The advances made in the production of power, in the economy of gasoline consumption and in simplicity of control are very great if we look back for a decade and remember what sort of a thing the carbureter was at that time; so in anticipating better things still we do so in no carping spirit. Let us rather congratulate the men who have made the carbureter what it is today, and add that with so much of success to their credit they have established a reputation for progressiveness which the world will look to them to maintain.

Better Bodies

OUR body builders, as well as our car manufacturers, may well point with pride to the recent national shows as typifying the marked progress which has been made during the past year. As compared with the cars of 1914, those of 1915 are fitted with bodies which are at once distinctive and graceful in appearance and serviceable and sensible in construction.

While European practice is responsible for much of the improvement, there is an encouraging element of initiative and enterprise on the part of our American body designers which is apparent in many ways to one making a study of the types on the market for the current season. This is a side of our body industry which must be cultivated and developed, the war in Europe rendering the present time an excellent opportunity to surpass the foreign builders' creations both in beauty and in the perhaps more essentially American respects of comfort and utility.

A natural development of American conditions, the all-weather car, appears this year in more numerous and varied styles than ever before, the high degree of all-around usefulness of the type, combined with the reasonable price possible, rendering it exceedingly popular. The originality displayed in designing these bodies is highly commendable, while the improvement in harmony and common sense in touring car construction and in reconciling luxury of finish with durability in closed car designs entitle the body makers to the congratulations of the entire industry.

But we must not stop here. Each succeeding year must see improvement; perhaps not in such marked degree as distinguished the past year, but still constant improvement. And the car maker and the accessory manufacturer must co-operate with the body builder to work toward greater simplification, stronger construction with less weight, increased refinement, lower prices and, above all, that great ideal, beauty of line and harmony of car units, so that all shall blend into a car as nearly perfect as it is possible to construct, with no discordant note to jar its symmetry.

And we must not forget that each advance that is made in one branch of the industry will have its effect on the other branches, thus rendering progress more or less uniform and consistent from year to year.

Because of this aspect of the situation, better bodies mean better chassis and better accessory fittings, and vice versa. The progress made in body design is reflected in the chassis, and the improvement in accessory development keeps pace with other developments in the industry.

61,599 Car Owners in Canada in 1914

Increase of Nearly 100 Per Cent. Since 1912—Gain of 20,279 Over 1913—Ontario Leads with 25,258

MONTREAL, QUE., Feb. 2—A remarkable growth of automobile owners in the Dominion is apparent by the fact that in the past 2 years the number of cars owned in Canada has increased almost 100 per cent., the actual figures being, 32,276 in 1912; 41,320 in 1913 and 61,599 in 1914. The Province of Ontario is easily first in the ownership of automobiles, her total being 25,258. The Province of Quebec maintained the ratio of increase with 3,579 automobiles and sixty-five trucks in 1912, as compared with 7,025 automobiles and 299 trucks in 1914.

PROVINCE	1914	1913	1912
Alberta	4,717	3,440	2,835
British Columbia	6,523	5,354	4,666
Manitoba	6,800	4,876	3,943
New Brunswick	1,240	789	700
Nova Scotia	1,253	1,000	867
Ontario	25,258	15,255	11,939
Prince Edward Island	Motorists are restricted to 2 days in the week		
Quebec	7,025	4,076	3,579
Saskatchewan	8,783	6,513	3,742
Yukon	No returns	17	5
Total	61,599	41,320	32,276

N. Y. Registrations 169,966 in 1914

NEW YORK CITY, Jan. 29—Twenty-five per cent. more licenses were taken out in this State in 1914 than in the previous 12 months, according to official figures given out by Secretary of State F. M. Hugo. There were 169,966 registrations in 1914, as compared with 134,405 in 1913; the comparative receipts $1,529,852 and $1,275,727, an increase of $254,125.

Export Club of Detroit Formed

DETROIT, MICH., Jan. 30—Following a luncheon given at the Board of Commerce, yesterday, in honor of William C. Downs, commercial attaché of the U. S. in Melbourne, Australia, the Export Club of Detroit was formed. Many prominent business men whose specialty is the export business were present at the meeting and it was considered that Detroit's importance from the export point of view is rapidly becoming such that it will greatly benefit the manufacturers and business in having an organization which will devote all of its time to promote and further the interests of those concerns doing an export business. Among the representatives from the automobile industry present at the luncheon were John A. Olt, foreign manager of the Hudson Motor Car Co.; C. R. Cook, export manager of the Cadillac Motor Car Co.; J. L. Hibbard foreign manager of the Studebaker Corp.; H. F. Vortkamp, president of the National United Service Co.

Edison to Build Benzol Plant

PITTSBURGH, PA., Feb. 1—Thomas A. Edison will erect a by-product plant to extract benzol from coking coal at the plant of the Cambria Steel Co.

England Offers Opportunities to Makers

LONDON, ENGLAND, Jan. 15—Admirable efforts are being made by many American truck and tire making firms to firmly establish themselves in this market but it is rather poor policy for many firms to spend money on such enterprises unless they are marketing the kind of merchandise that is wanted in this country. There could not be any more opportune time to establish truck agencies or branches, but these vehicles must follow conventional European lines having the motor under a forward hood or bonnet. It is practically useless to attempt to market trucks with motors under the floor boards as this type of vehicle is not popular in England. Gasoline trucks of 3, 4 and 5-ton capacity are much in demand here at present.

Electric truck makers, who are going to attempt the British market, would be better off by opening branches than agencies. The Britisher here knows very little about electrics and is not even familiar with their good selling points. It will take some time to introduce them.

Previous to the war approximately 65 per cent. of the solid tire business was done by German firms and there is no more opportune time for American makers of tires to get established, providing they build the solid-base tire. The squat-section solid tire that has been offered by several American makers is not quite suited for London, a deeper section being preferred.

$1,000 Truck Subject of S. A. E. Discussion

NEW YORK CITY, Jan. 29—If the discussion following the paper on the possibilities for the sale of American-made motor vehicles in Europe after the war, read by A. Ludlow Clayden before the meeting of the Metropolitan Section of the Society of Automobile Engineers, can be taken as a criterion, a much greater interest will be felt in the truck field than in the passenger car line. In spite of the effort on the part of the chair to bring the discussion back to passenger cars the field of the truck occupied almost the entire part of the meeting devoted to this discussion.

The discussion brought out one fact more strongly than any other, and that is that there does not seem to be any definite idea as to what vehicle would be most suited in the way of a commercial car for all-around purposes in Great Britain and on the Continent. Many of the speakers pointed out that our American method of rating trucks would not correspond to the English method. The reason assigned for this is that the European buyer has not been educated up to the point of respecting capacity ratings. If he buys a 1-ton truck he is prone to load it to the extent of a ton and a half. Correspondingly with trucks of greater capacity he is apt to load them to a greater amount than that called for in the specifications. The result has been that makers have cut their ratings because they know that the users will not respect them, and in order to be on the safe side they are forced to give a low figure.

Another point brought up was that the English buyer of commercial vehicles does not expect the extended service required by the American buyer. In fact, to a large extent, when the sale is closed the transaction is ended, whereas in America when the truck sale is closed the transaction has only begun, and as many of our manufacturers put it, they are selling service and not trucks.

The request of the author of the paper for a good 1-ton truck brought forth the prediction that such a vehicle would be available before long, although it seemed to be the general consensus of opinion that the identical truck wanted by the English for all-around use is not as yet being produced in this country.

The small amount of discussion on the passenger car seems to show that the principal market would be a direct replacement of a large number of cars which are being destroyed as a direct effect of the war. Another reason for a development of both the passenger car and commercial car market is in the large mortality of horses.

John R. Eustis, who spoke later on the uses of automobiles in the present war, brought up the thought that after the war there would be a large amount of used cars suddenly thrown on the market which might have a definite effect upon the purchase of the lower priced cars. Mr. Eustis gave a short lecture and showed a large number of lantern slides illustrating war automobiles of all kinds in various places.

INDIANAPOLIS, IND., Feb. 1—The eight-cylinder car will be discussed from every angle by prominent engineers in Indianapolis, February 16, at a special meeting of the Indiana Section of the Society of Automobile Engineers. The small bore, high-speed type motors will also be discussed at the meeting.

Jeffery Gets French War Order

100 Quads Worth $350,000—50 for Immediate Delivery—Balance 25 Per Week

CHICAGO, ILL., Feb. 1—The Thomas B. Jeffery Co., of Kenosha, Wis., has sold 100 of its Jeffery Quad trucks to the French Government, it was announced today, an order approximating $350,000 in value. The order specifies the delivery of fifty immediately, with the remainder to follow at the rate of twenty-five a week. The Quads will be fitted with the same style of body as used in the United States army, a box type with a bow top and a cab driver's seat.

The Jeffery company already is well represented in the European war, France having previously purchased fifty of the chain-drive type of Jeffery truck. The Canadian contingent took with it sixty of the Quads; England has bought twenty-five of them and Russia twenty-five.

More Trucks Leave for War Zone

LIMA, O., Jan. 30—The first consignment of motor trucks shipped from Lima, Ohio, for use in the European war left the Gramm factory recently, consigned to New York. The order for these trucks was received in November and the Willys-Overland Co. of Toledo booked it. That was before the reorganization of the Gramm Motor Truck company under the Geiger-Jones company of Canton.

The trucks are of the 3-4-ton type and will be included in an order of 3- and 4-ton trucks made at the Toledo and Elyria factories. All will be tested in New York before being shipped to the war zone. The Gramm trucks will be used in the distribution of supplies while the heavier trucks will be used to transport equipment. The order from the Gramm plant was for twenty-five trucks.

MILWAUKEE, WIS., Jan. 30—The Sternberg Motor Truck Co., West Allis, Milwaukee, is making final deliveries on an order for 100 Sternberg motor trucks for the allied armies of Europe. Most of the trucks are consigned to Russian ports. Each car has been given a 300-mile test with rated capacity load. An interesting feature of the tests was the fact that each truck made frequent trips from West Allis to Waukesha, Wis., where the Sternberg motors are built by the Waukesha Motor Co., carrying scrap on the out trip and finished motors on the return trip.

Briscoe Leases Cutting Plant—May Buy

DETROIT, MICH., Feb. 3—*Special Telegram*—The Briscoe Motor Co. has leased for 1 year the old Cutting plant in Jackson, Mich., with privilege of purchasing it. The Briscoe company will use this plant for motor assembling, painting and trimming and thus will give employment to about 300 more men.

INDIANAPOLIS, IND., Feb. 2—About March 1, C. C. Hanch will give up his active connection with Nordyke & Marmon Company to accept an important post in the executive organization of the Studebaker Corporation, of South Bend.

RICHMOND, IND., Feb. 1—T. H. Hill who has been treasurer and general manager of the Pilot Motor Car Co. for some time, has resigned his position and his place will be taken by George E. Seidel, president of the Pilot company. Mr. Seidel is also president of the Seidel Buggy Co.

Republic Rubber's $3,000,000 Issue Approved

YOUNGSTOWN, O., Jan. 29—Approval was voiced at the annual meeting of the stockholders of the Republic Rubber Co., this city, on a preferred stock issue of $3,000,000. Formal action will not be taken until a special meeting to be called in February.

Of the proposed issue but $2,500,000 will be required to replace stock of this character yet outstanding, which matured September 1, 1914. The remainder will be available for plant extensions contemplated as business warrants.

The former board of directors and its officers were reelected. Members of the board are T. L. Robinson, L. T. Petersen, J. H. Kelly, A. H. Harris, M. I. Arms, John Tod, David Tod, J. G. Wick, Robert Bentley, and H. K. Wick. Officers are: President, T. L. Robinson; first vice-president and sales manager, J. H. Kelly; secretary, C. F. Garrison, and treasurer, M. I. Arms.

Mitchell Business Large—Debts Small

RACINE, WIS., Feb. 1—Reports of officers of the Mitchell-Lewis Motor Co., Racine, Wis., presented to the annual meeting, showed that during the period from August 1, 1914, to January 1, 1915, the company manufactured and sold more Mitchell cars than during any similar period in the history of the company. The report of President McClaren showed that the debt condition is lower than at any time in the company's existence; that the volume of business, number of men being engaged, number of dealers, and the financial position are larger and stronger at this time than at any time since the concern was founded in 1834. The annual election resulted as follows:

President, H. L. McClaren; first vice-president, John W. Bate; second vice-president, William T. Lewis; treasurer, Frank L. Mitchell; secretary and assistant treasurer, William H. Armstrong; comptroller, Martin J. Gillen; sales manager, Otis C. Friend. The officers enumerated here also comprise the board of directors. Mr. McClaren also occupies the position of general manager and Mr. Bate that of chief engineer and factory superintendent.

Automobile Securities Quotations

NEW YORK CITY, Feb. 2—Although the general tone of the market for the past week was slightly weaker than for the preceding 7 days, a number of the stocks showed substantial gains. Kelly-Springfield continued its upward trend by going 4 points higher on the common and 7 on the second preferred. Increased manufacturing activity and in orders received was probably largely responsible for the four point increase of Case preferred. General Motors continued strong, the common gaining 3 points and the preferred 2. Maxwell common and first preferred gained 1-2 and 1 point, respectively, while the second preferred lost 3-4 point. Other stocks which were lower than last week are: Reo, Car and Truck, each 1-2 point; Studebaker common 1-2 and preferred 2 and U. S. Rubber common 1 and preferred 2. Oils were weak, Texas being 2 lower than last week and Vacuum 4. Stewart-Warner common lost 3 points, but the preferred gained 2.

	1914		1915		Net
	Bid	Asked	Bid	Asked	Ch'ges
Ajax-Grieb Rubber Co. com	200	..	250	..	..
Ajax-Grieb Rubber Co. pfd	98	101	100	..	..
Aluminum Castings pfd	97	100	95	100	..
J. I. Case pfd	..	..	79	81	+4
Chalmers Motor Co. com	..	92	..	96	..
Chalmers Motor Co. pfd	93	94½	90	93½	..
Electric Storage Battery Co	..	..	..	..	..
Firestone Tire & Rubber Co. com	246	252	370	375	..
Firestone Tire & Rubber Co. pfd	105	107	109	111½	..
General Motors Co. com	63	65	93	95	+3
General Motors Co. pfd	86	88	95	97	+2
B. F. Goodrich Co. com	25	26	30¾	31	+ ¾
B. F. Goodrich Co. pfd	89	91	96	97½	..
Goodyear Tire & Rubber Co. com	220	230	193	196	—1
Goodyear Tire & Rubber Co. pfd	100	102	101¾	102½	— ¼
Gray & Davis, Inc., pfd	90	97	..	..	..
International Motor Co. com	..	5	..	..	..
International Motor Co. pfd	..	15	..	..	..
Kelly-Springfield Tire Co. com	59	60	97	100	+4
Kelly-Springfield Tire Co. 1st pfd	126	128	82	83	..
Kelly-Springfield Tire Co. 2d pfd	..	..	112	116	+7
Maxwell Motor Co. com	4½	5	17	17½	+ ½
Maxwell Motor Co. 1st pfd	26½	27½	54	56	+1
Maxwell Motor Co. 2d pfd	8	8½	20¼	21¼	— ¾
Miller Rubber Co. com	..	..	158	165	..
Miller Rubber Co. pfd	124	130	101	103	..
Packard Motor Car Co. com	..	..	..	100	..
Packard Motor Car Co. pfd	95	99	93	..	..
Peerless Motor Car Co. com	15	25	13	20	—2
Peerless Motor Car Co. pfd	75	80	..	55	..
Portage Rubber Co. com	..	40	30	36	..
Portage Rubber Co. pfd	..	90	80	85	..
*Reo Motor Truck Co	7	7½	11½	12	— ½
*Reo Motor Car Co	16	16½	24½	25	— ½
Splitdorf Electric Co. pfd	40	50	69	71	..
Stewart-Warner Speed. Corp. com	52	54	48	50	—3
Stewart-Warner Speed. Corp. pfd	96½	..	101	103	+2
Studebaker Corporation com	27	28	41½	42¼	— ½
Studebaker Corporation pfd	82	85	92	93½	—2
Swinehart Tire & Rubber Co	69	71	69	71	..
Texas Company	..	..	131	135	—2
U. S. Rubber Co. com	59½	60	56	57	—1
U. S. Rubber Co. pfd	102	102½	102	104	—2
Vacuum Oil Co	213	216	195	198	—4
White Company pfd	105	110	108	110	..
Willys-Overland Co. com	62	64	90	91	—1½
Willys-Overland Co. pfd	91	95	93	95	..

*Par value $10; all others $100 par value.

Market Reports for the Week

NEW YORK CITY, Feb. 3—Unusual changes occurred in the metal markets in this week's market reports. Tin went up $2.88 per 100 pounds, closing at $37.88. Sales at this price are scarce. Lead went up $0.12 1-2 per 100 pounds. This metal was quiet and less firm. Antimony closed at $0.17 at a gain of $0.01 and both electrolytic and Lake coppers went up in prices, the former 1-2 cent and the latter 3-8 cent. A small demand in electrolytic is reported. According to London cables the supply of standard copper available in Great Britain and France, including supplies afloat at the beginning of February, were 35,500 tons; deliveries during the last fortnight having been 300 tons more than supplies. Fine Up-River Para rubber dropped to $0.59, after a fluctuating week. There were no changes in the oil and lubricants markets.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.16	..	.17	.17	.17	.17	+.01
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	1.21	.....
Bessemer Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	.....
Copper, Elec., lb.	.14⅛	.14⅛	.14½	.14½	.14⅝	.14⅝	+.00½
Copper, Lake, lb.	.14⅜	.14⅜	.14⅝	.14⅝	.14¾	.14¾	+.00⅜
Cottonseed Oil, bbl	6.91	6.95	7.00	7.00	7.07	7.15	+.24
Cyanide Potash, lb.	.21	.21	.21	.21	.21	.21	.....
Fish Oil, Menhaden, Brown	.41	.41	.41	.41	.41	.41	.....
Gasoline, Auto, bbl.	.12	.12	.12	.12	.12	.12	.....
Lard Oil, prime	.90	.90	.90	.90	.90	.90	.....
Lead, 100 lbs.	3.67½	3.67½	3.80	3.80	3.80	3.80	+.12½
Linseed Oil	.60	.60	.60	.60	.60	.60	.....
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	.....
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	.....
Petroleum, bbl., Pa., crude	1.50	1.50	1.50	1.50	1.50	1.50	.....
Rapeseed Oil, refined	.71	.71	.71	.71	.71	.71	.....
Rubber, Fine Up-River, Para	.62	.62	.61	.60	.59	.59	—.03
Silk, raw, Ital.	..	3.90	..	..	3.90	3.90	.....
Silk, raw, Japan	..	3.45	..	..	3.45	3.45	.....
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	35.00	36.00	37.00	37.25	38.00	37.88	+2.88
Tire Scrap	.05	.05	.05	.05	.05	.05	.....

Goodrich and Fisk Cut Tire Prices—Others May Follow Soon

AKRON, O., Feb. 1—The B. F. Goodrich Co. has adopted a new method for quoting dealers' prices and at the same time has made a reduction in prices to the consumer. The new method of quoting eliminates the percentage basis and gives straight prices to both the dealer and consumer. That no percentage scheme has been followed will be evident from the prices on the new tire sizes which have been built up from cost, thus allowing each tire size to stand by itself without depending on a more popular size for its profit. The table of old and new prices for plain tread tires follows:

PLAIN TREAD SIZE	OLD	NEW	REDUCTION
30 x 3	$11.70	$9.00	$2.70
30 x 3 1-2	15.75	11.60	4.15
32 x 3 1-2	16.75	13.35	3.40
34 x 4	24.35	19.05	5.30
36 x 4 1-2	35.00	27.35	7.65
37 x 5	41.95	32.30	9.65

Although formal announcement of other price cuts have not been made by many other makers, as yet, it is expected that some of the other big makers will join in the downward revision. This is evident by the fact that the Fisk Rubber Co. has already sent announcements to the trade covering new price lists for consumers and preferred trade, taking effect on February 1. The cut in price is said to be due to the lower cost of crude rubber resulting from the increased supplies from the Far East since the raising of the embargo. That the readjustment of prices is complete is shown by the following list of prices on Fisk Q. D. clincher tires:

PLAIN TREAD SIZE	OLD	NEW	REDUCTION
30 x 3 1-2	$16.60	$11.60	$5.00
32 x 3 1-2	17.65	13.35	4.30
34 x 4	25.65	19.40	6.25
36 x 4 1-2	36.85	27.35	9.50
37 x 5	44.15	32.30	11.85

United States, Braender, Thermoid, Ajax, Kelly-Springfield, McGraw and Knight have not as yet decided upon any price change. Ten days ago the Republic company lowered its prices 10 to 12 per cent. to the consumer on casings.

Goodrich 1914 Profits $5,440,000

Total Undivided Profits Now $3,177,400—Quick Assets Show Gain of $2,950,000

AKRON, O., Jan. 29—The B. F. Goodrich Co., this city, earned in 1914, 5.65 per cent. on its $60,000,000 common stock, compared with 0.83 per cent. in 1913 on the same stock. The net profits for 1914, ended December 31, approximated $5,440,000. This amount added to the surplus on December 31, 1913, $705,900, brought the total undivided profits up to $3,177,400, after deducting the four quarterly dividends of 1 3-4 per cent. on the preferred stock outstanding, together with a provision of $900,000, July 1, 1914, for the redemption of preferred stock, as called for by the articles of incorporation.

The report states that the company's financial position was materially strengthened during the past year, the amount of quick assets over current liabilities on December 31 last showing a gain over the previous year of approximately $2,950,000. The contingent liability in respect of bankers' loans made on behalf of the Société Française—B. F. Goodrich, and which existed at December 31, 1913, has been entirely liquidated. The company has on hand cash to the amount of $4,175,000 and has no bills payable outstanding. The current assets amount to approximately $20,300,000 and the current liabilities to $1,470,000. The company has no bonded debt.

At the regular quarterly meeting of the directors held on January 27 there was retired, subject to the approval of the stockholders at their annual meeting on March 10, 11,000 shares of preferred stock, which, together with 9,000 shares appropriated at the July meeting of the board, makes a total retirement of 20,000 shares.

The company holds 20,587 shares of preferred in its treasury, paying dividends on them. In the hands of the public there will remain of the original $30,000,000 preferred issue $25,941,300 after the retirements up to July 1 this year. The company is very evidently reducing its outstanding shares, so that these shall be more in line with year in, year out earnings.

In connection with the dividend policy of the company the report states that, although a dividend of 3 1-2 per cent. was declared on the preferred stock, 1 3-4 per cent. payable April 1, and 1 3-4 per cent. payable July 1, at a recent meeting, no action was taken or contemplated in the near future regarding dividends on the common stock.

The preliminary statement of the company for 1914 is compared as follows:

	1914	1913		Changes
Cash on hand	$4,175,000	$723,053	Inc.	$3,451,947
Bills payable	.....	2,799,736	Dec.	2,799,736
Current assets	*20,300,000	723,053	Inc.	19,576,947
Current liabilities	*1,470,000	3,505,974	Dec.	2,035,974
Net profits	*5,440,000	2,599,747	Inc.	2,840,253
Div. on pfd. stock	2,048,500	2,100,000	Dec.	51,500
Balance	3,391,500	499,747	Inc.	2,891,753
P. C. common stock	5.65	0.83	Inc.	4.82
Com. stock dividend	....	600,000	Dec.	600,000
Pfd. stock redemp.	900,000	....	Inc.	900,000
Previous surplus	705,982	802,235	Dec.	100,252
Final surplus	3,177,483	705,982	Inc.	2,471,501

*Approximately.

Fisk 1914 Profits Increase $336,204

CHICOPEE FALLS, MASS., Jan. 29—The fiscal report of the Fisk Rubber Co., this city, which ended October 31, 1914, shows an increase in net profits of $336,204 over 1913, the net profits for 1914 being $942,204. The surplus for 1914 shows an increase of $229,725, the 1913 surplus being $285,833 and the 1914 surplus being $350,000. The 1913 surplus includes a $42,777 dividend on the preferred stock of the Fisk Rubber Co. of Delaware. Out of the net profits made in the fiscal year 1914 there were retired on December 31, 2,250 shares of first preferred stock. Statement follows:

	1914	1913	Increase
Net profits	$942,204	$606,000	$336,204
Inventory reserve	160,000	117,688	42,312
Balance	$782,204	$488,312	$293,892
Preferred dividends	350,000	285,833	64,167
Surplus for year	$432,204	$202,479	$229,725

Dewar Trophy for Coke-Burning Bus

Automatic Stoker Replaces Kerosene Burner on Standard Type of Steam Omnibus

LONDON, ENG., Feb. 1—A motor omnibus run by steam generated from coke is the latest novelty in this city. The Royal Automobile Club has awarded to the National Steam Car Co., the Dewar Challenge Trophy for the most meritorious achievement of the year in automobile engineering.

Instead of having a furnace fed with paraffin, the new omnibus automatically stokes itself with coke. The bunkers are inside the bonnet and surround the boiler. Thus not only is the coke kept dry and warm, but also it acts as lagging to the boiler and prevents loss of heat.

It is a small vertical boiler, with the furnace underneath; and mechanical feeders, which may be likened to the fingers of a hand, pass the coke downward to the fire. An ingenious device prevents clinkering. The bunkers, which can be easily replenished, hold sufficient coke for a run of 50 to 60 miles.

On a 100-mile trial trip to Brighton and back a lorry weighing with its load 6 1-2 tons used 446 pounds of coke in 109 1-2 miles and ran 87 3-4 miles before it was necessary to stop for water. The average speed was 12 miles an hour, and the cost for fuel is less than one-third that of an omnibus using paraffin for steam generating.

Manchester, Eng., Show for April 16

MANCHESTER, ENG., Feb. 1—The North of England Motor Shows, Ltd., will conduct an automobile show in this city on April 16 to 24. The show will be held at the Manchester Ice Palace and will include automobiles, commercial vehicles and accessories.

English Efficiency Test of Cord Tires Shows Fuel and Power Economy

LONDON, ENG., Jan. 27—Some interesting tests have just been carried out on the Brooklands race track, to make comparisons between the behavior of tires made with the well-known system of interlaced cords instead of canvas lining and tires of other makes.

The tests consisted of gasoline consumption tests of a car fitted first with Palmer tires and secondly with ordinary canvas covers. In each case the tires had been inflated to 60 pounds front and 72 pounds back. The weight of the car was 2 tons 4 cwt. and the size of the tires was 34 by 4 1-2 inches. With the car shod with ordinary canvas covers the gasoline consumption worked out at 18 miles, 897 yards to the gallon, while with the Palmer tires fitted the mileage improved to 20 miles 782 yards.

Then speed tests were held under similar conditions as regards the wheels. The throttle was fixed at a point which provided a speed as close as possible to 30 miles an hour, and with the ordinary tires 31.68 miles were covered in the hour, and with the Palmer 33.89 miles. This test having been concluded, a coasting test was made, which produced some exceedingly striking results. The car was released on a gradient of 1 in 12 over a distance of 120 feet, and from a standing start with ordinary tires fitted coasted 1,118 feet, attaining a maximum of 21½ miles an hour, whilst when running on Palmer cord tires it coasted 1,746 feet, attaining a maximum of 24½ miles an hour.

Marvel-Equipped Oakland Makes 23.7 M. P. G.

CHICAGO, ILL., Jan. 28—In a blinding wind, and on one of the coldest days of the year, an Oakland 37 roadster with a Marvel carbureter, yesterday made an official economy run on Chicago's boulevards, and accomplished 23.7 miles on 1 gallon of gasoline. The economy test was held under the sanction of the American Automobile Association, the test being supervised by Darwin S. Hatch of *Motor Age*, representing the Contest Board of the A. A. A.

The car was driven by Al. Meisner of the Chicago Oakland branch, and with him rode E. A. Turner of the Chicago Automobile Club, as observer. The gasoline and oil used was supplied by the Texas Oil Co., and according to the official report the fuel was 61.25 Baumé gravity at 36 F. This would be 63.65 Baumé at 60 degrees F. The gallon measure was stamped correct by the city sealer of Chicago, and speedometer was checked for accuracy.

The Oakland that made the best mileage was a model 37 four-cylinder car of 3 1-2 by 5 inches, bore and stroke, and was fitted with a Marvel carbureter, Delco electric system, Stewart vacuum fuel feed, and Goodyear 33 by 4-inch tires. The roadster, according to the officially balanced scales, weighed 2,875 pounds with its load, and 2,510 pounds empty.

Federal Cuts Price—Adds 3 1-2 Tonner

DETROIT, MICH., Jan. 29—A feature of the 3-days convention of the dealers of the Federal Motor Truck Co., which was held last week, was the decision to lower the price of the 1 1-2 ton worm-drive Federal from $1,900 to $1,800 and the addition of a 3 1-2 ton worm-drive chassis to sell at $2,800. The various discussions among dealers and factory men also brought about some minor constructional changes.

G. M. Truck Holds Convention

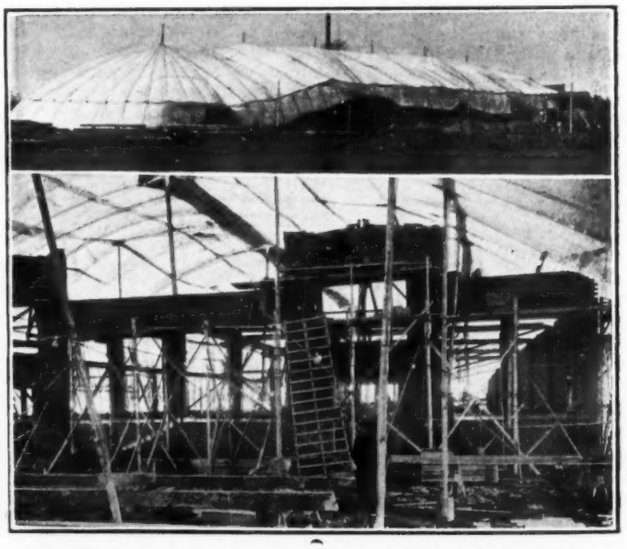
PONTIAC, MICH., Feb. 1—A 3-days convention of the district sales managers of the General Motors Truck Co., started today. According to all present, and they came from all parts of the United States, the automobile truck business outlook is decidedly encouraging.

150 Cadillac Men in Session

DETROIT, MICH., Feb. 2—More than 150 Cadillac dealers were present this morning in the convention hall of the Hotel Ponchartrain, when the annual convention of the Cadillac Motor Car Co.'s sales organization was opened. During the 3-day convention all matters relating to the welfare of the business from every angle will be discussed between the dealers and chiefs of the various departments of the Cadillac company. There will be entertainments and a big banquet.

Associated Garages of America Formed

CHICAGO, ILL., Feb. 1—The Associated Garages of America, the national association of garagemen, was organized in this city, January 27. Robert Bland, of Evanston, Ill., former president of the Garage Owners Assn. of Illinois, was made president. F. A. Beane, president of the Detroit garagemen, was named treasurer. W. L. Rudd was made vice-president.



CLEVELAND, O., Jan. 30—Erecting a factory under a tent: The Willard Storage Battery Co. is building a plant 300 by 100 by 30 feet beneath a 5,000 square yard spread of canvas, and it is to be finished in 3 weeks. Under the big tent there are 570 workmen and building is going on 24 hours a day. Steam pipes laid against the brick walls assist in quick drying. The building was started on January 10 and is to be finished February 1. This is the third building to be erected on the new 10-acre site of the company, and it is planned to have fourteen by the first of January, 1916.

Claims Floating Spider Infringes

Kardo Suit Against Former Reo Representative Is Heard—Decision Expected in 10 Days

CLEVELAND, O., Jan. 30—That the Reo Motor Car Co., in adopting in its bevel gear drive a compensating mechanism termed a floating spider, infringed on patent No. 792,690, issued to Alanson P. Brush, of Detroit, is the allegation of the Kardo Co., substituting for the American Ball Bearing Co. in action against Henry J. Adams, former representative of the Reo factory and dealing locally as the Reo Motor Sales Co.

Judge John H. Clarke heard testimony and arguments of the attorneys, opening the case last Friday. This final hearing follows that of the American Ball Bearing Co. against Edward B. Finsh, representing the Chalmers Motor Co. In the Chalmers case Judge Clarke will be unable to render an opinion for a week or 10 days. He has found it necessary to review the legal citations and to study the history of the case.

Direct evidence was heard in the Reo case Friday and Saturday, and rebuttal testimony was given Monday and Tuesday. Witnesses Monday were Charles E. Duryea, H. T. Thomas, chief engineer of the Reo company; Walter C. Baker, Fred C. Dorn, treasurer of the American Ball Bearing Co.; Phillip Dorn, with the American Ball Bearing Co., and Donald C. Carpenter, professor of mechanical arts in Cornell University.

The Kardo Co. "fell heir" to the suit against the Reo representative when it took over the patents of the American Ball Bearing Co. The bill of complaint was filed June 25, 1913, and the case was transferred to The Kardo Co., October 3, 1914.

The mechanism in question has to do with light, quiet running operation of an automobile, and the complaint alleges the compensating gear arrangement is the same as that for which Mr. Brush received a patent which he assigned to the American Ball Bearing Co. Prior art testimony was introduced by the defense.

To familiarize himself with all the conditions that have arisen in these automobile patent suits Judge Clarke questioned Walter C. Baker concerning the organization and aims of The Kardo Co. Mr. Baker explained that patents of the Peerless Motor Car Co., the Packard Motor Car Co., The American Ball Bearing Co. and the Baker Motor Vehicle Co. were so similar that each had been threatening the other with legal action. As a means for the solution of all the dissension and better control of the patents which each organization held the Kardo Co. was formed.

Judge Clarke expects to close the Reo case Wednesday or Thursday, and it will be 2 weeks before he can render an opinion, it is believed.

Counter Charges Made in Ritz Suit

NEW YORK CITY, Feb. 1—The Driggs-Seabury Ordnance Corp., Sharon, Pa., has filed its answer in the suit of the Ritz Cycle Car Co., of this city, which recently asked for $50,000 damages, alleging that the Driggs-Seabury corporation failed to carry out its part of an agreement entered into April 8, 1914. In its answer the Driggs-Seabury corporation denies that the Ritz Cycle Car Co. has been irreparably injured by any of its acts and asks for the dismissal of the bill of complaint for lack of jurisdiction inasmuch as the Driggs-Seabury Ordinance Corp. has no designated agent in the state of New York or in the southern district of New York. The agreement in question, it alleges, was entered into at Sharon, Pa.

The answer goes on to charge that the Ritz company did not furnish workmanlike drawings, plans and specifications of the car in accordance with the agreement in sufficient time to permit the manufacture of the cars in the time specified. It also alleges that payment was refused on the two notes for $2,500 each, given by the Ritz company to cover, among other things, the necessary dies, jigs, tools, etc., for the manufacture of the car. The answer claims that the agreement provided that in the event of its cancellation the Ritz company should assist the Driggs-Seabury corporation in marketing any cars left on its hands. It alleges that the Driggs-Seabury corporation spent $2,337.17 in building a car at the order of the Ritz Cycle Car Co., for which it has never been paid. With protest fees on the two unpaid notes and accrued interest the Driggs-Seabury corporation claims the Ritz Cycle Car Co. owes it $7,339.72. It asks dismissal of the bill of complaint, denial of the Ritz company's application for injunction, with costs in favor of the Driggs-Seabury corporation and for a judgment against the Ritz Cycle Car Co. of $7,339.72 with interest. The suit is in the U. S. district court for the southern district of New York.

Charges Infringement of Bumper Patent

NEW YORK CITY, Feb. 1—Suit has been brought against the Charles Weiland Co. of this city by Allan L. McGregor, Chicago, Ill., charging infringement of his patent No. 1,088,832 covering a bumper construction. McGregor asks for an injunction and damages. The suit is in the U. S. district court for the southern district of New York.

Temporary Injunction in Horn Suit

NEW YORK CITY, Feb. 3—Judge Lacombe has granted a temporary injunction in favor of Lovell-McConnell Mfg. Co., in its suit against the Heinze Electric Co., in which it charged unfair competition, alleging that a large motor-operated horn made by the Heinze company is an imitation in appearance of the right-angle design of the type L Klaxon. It will be remembered that this matter came up during the New York automobile show. The suit is in the U. S. district court for the southern district of New York.

Partin-Palmer Maker May Reorganize

CHICAGO, ILL., Feb. 1—Three creditors whose claims aggregate $700 have made application to adjudge bankrupt the American Mfg. Co., builder of Partin-Palmer cars. The American Mfg. Co. is a Chicago concern very closely allied with the Partin Mfg. Co., the latter being practically the sales organization for Partin-Palmer cars. The liabilities of the American company amount to more than $125,000, and the assets, in the form of car parts, etc., to about $15,000. The firm is of the opinion that a reorganization will straighten matters out and under such conditions there would be little difficulty it is stated in paying all the debts of the company. The Partin Mfg. Co. only recently announced a new model, the 25, and has for some time been marketing the 38. Both cars are four-passenger types.

Elections of 1915 Officers

FINDLAY, O., Jan. 28—At the annual meeting of the stockholders of the Adams Brothers Co., Dr. N. L. MacLachlan was elected president; Murray Irwin, vice-president and general manager; G. M. Carter, secretary; B. B. Bigelow, treasurer. These officers and E. C. Edwards, W. F. Hosler, W. A. Hollington, and J. G. Kwiss were elected directors. F. E. Liddle, formerly of Jackson, Mich., has been appointed factory superintendent.

RACINE, WIS., Jan. 26—At the annual meeting of the stockholders of the L-P-C Motor Co., William Mitchell Lewis was elected president; J. M. Cram, vice-president; F. S. Gordon, secretary; and G. B. Wilson, treasurer. These officers and Rene M. Petard were elected directors for the current year.

The capital stock of the company was increased from $250,000 to $350,000. It was announced at the meeting that during the first nine months of operation since the company was started, 380 cars were made and sold and that the business outlook is most satisfactory.

FINDLAY, O., Jan. 26—The following officers were elected for the current year at the annual meeting of the stockholders of the Grant Motor Co.: David A. Shaw, president; George D. Grant and George S. Salzman, vice-presidents; George S. Waite, secretary and sales manager. The board of directors consists of these officers and E. A. Dorsey, J. M. Howe, Roger R. Hall and Charles A. Grant.

KENOSHA, WIS., Jan. 30—At the annual meeting of the Badger Brass Mfg. Co., Kenosha, Wis., manufacturing Solar lamps, Gordon Yule was elected a director to fill the vacancy caused by the death of his father, William L. Yule. Officers were re-elected as follows: President, George A. Yule; vice-president, William H. Yule; secretary, L. J. Keck; treasurer, Richard H. Welles.

TOLEDO, O., Feb. 1—At the annual meeting of the stockholders of the American Metal Wheel Co., Henry Streetman was elected president; F. H. Steel, vice-president; J. C. McKisson, secretary-treasurer; C. W. Bennett, general manager. These officers and Ira C. Taber, J. C. Anderson and Joseph Roth, form the board of directors.

Speedway Men Confer—Chicago Sanction

New York Speedway To Become a Reality

CHICACO, ILL., Jan. 29—Chairman Richard Kennerdell of the contest board of the American Automobile Assn. was the guest of honor at a luncheon given yesterday at the Chicago Automobile Club by *Motor Age* which was also attended by representatives of the leading speedways and by representatives of concerns interested in racing. At this luncheon a get-together spirit was displayed and the speedway people became acquainted with each other for the first time. Plans were discussed, each track told of its progress on the season's plans and the car makers' representatives outlined what their respective companies intend doing this season.

As a result of this luncheon the promoters have a fair idea of what support they may look for from the manufacturers and at the same time Chairman Kennerdell was able to straighten out several disputes as to dates. Probably one of the most significant facts connected with the luncheon was the statement made by J. G. Vincent, chief engineer of the Packard company, who was present, who told the racing folk that while he could not speak officially for the Packard company, still he would say that if Packard did not race this year he, himself, would have one or two cars in the big events.

For the Maxwell company Ray Harroun stated there would be seven Maxwell racing cars in the big events this year, four of them of the new 300-inch class and the remaining three the same ones the company campaigned last year. Five of these will be raced by the company direct and the other two turned over to E. A. Moross for the dirt track campaign. Harroun has four drivers signed at the present time, including Barney Oldfield, Billy Carlson, Harry Grant and Ed. Rickenbacher.

The Stutz company was represented by its sales manager, H. W. Anderson. There will be six Stutzes raced this year, three of them of the 300-inch type and the others the ones campaigned last year. The Stutz team consists of Earl Cooper, Gil Anderson and Howard Wilcox, the last named being the most recent addition to the team.

George Dickson, general manager of the National company, also was among those present. Dickson states that his company will not race this year, but that this does not mean that the big blue cars never will be seen in speed contests again. He urged those present to support the American Automobile Association, pointing out the strong need of a national organization at this, the most crucial time of the sport.

Representing the tracks were T. E. Myers, of the Indianapolis speedway; F. E. Edwards, of the Chicago speedway; Felix McShayne, of the Omaha speedway; E. R. Schultz, of the Sioux City speedway; F. W. Jencks, of the Elgin Automobile Rotaries Assn.; J. E. Callender, chairman of the contest board of the Chicago Automobile Club; and E. P. Robinson, of Galesburg. E. C. Patterson, backer of Ralph de Palma, represented the owners.

From the reports handed in by the speedway managers it looks as if both the newcomers, Omaha and Chicago, will be in position to race this summer according to schedule, as work on their respective plants is progressing nicely. Omaha and Sioux City are still in doubt as to their exact dates, the matter being held up until Tacoma can be heard from.

Considerable enthusiasm was aroused by the receipt of a telegram from J. C. Nichols, representing the New York speedway, who stated that all the necessary money has been raised, the land secured and contracts are being let, so it is hoped to have the track done by fall so that a big meet can be held some time in September.

Following the luncheon Chairman Kennerdell and Clifford Ireland, a western member of the A. A. A. contest board, who also was present at the affair, visited the new Chicago speedway in company with Contest Director F. E. Edwards. Both were satisfied as to the progress being made and issued the necessary sanction for the 500-mile race, which is scheduled to be run June 19.

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19 Entries to Date for Exposition Races

NEW YORK CITY, Feb. 1—The following are the entries as received to date by W. L. Hughson, chairman of the racing committee of the Panama-Pacific International Exposition, which will hold the Vanderbilt Cup and Grand Prix races on February 22 and February 27, respectively:

Car	Driver	Owner
Stutz	Anderson	Stutz M. C. Co.
Stutz	Cooper	Cooper.
Duesenberg	O'Donnell	F. S. Duesenberg.
Stutz	Wilcox	Stutz M. C. Co.
Duesenberg	Alley	F. S. Duesenberg.
Peugeot		Peugeot Auto Import Co.
Peugeot		Peugeot Auto Import Co.
Delage	Newhouse	W. E. Wilson.
Tahis	Gable	Fred. Robinson.
Mercer	Pullen	Mercer Automobile Co.
Mercer		Mercer Automobile Co.
Mercer		Mercer Automobile Co.
Marmon	Cadwell	A. A. Cadwell.
Marmon	D'Alene	W. D'Alene.
Simplex	Disbrow	Simplex Auto Co.
Chevrolet	Le Cain	Chevrolet Motor Co.
Maxwell	Oldfield	Maxwell Motor Corp.
Maxwell	Carlson	Maxwell Motor Corp.
Maxwell	Rickenbacher	Maxwell Motor Corp.

Three Porter-Knights for Indianapolis

NEW YORK CITY, Feb. 1—The Finley Robertson Porter Co., Port Jefferson, L. I., will be represented at the Indianapolis 500-mile race in May by at least three cars, according to Finley R. Porter, president of the company. As announced in THE AUTOMOBILE last week, it is the intention of the company to compete in all important events of the year. Mr. Porter states that the announcement of the intended move of the company to Indianapolis was a misunderstanding, as the factory will continue to be located at Port Jefferson.

As described last week the Knight motor, which will be used in the F. R. P. car, will be a 3 3-4 by 6 1-8-inch, four-cylinder type, capable of 3,500 r.p.m. The piston displacement which was given as 207 cubic inches, is 270 and the wheels are 32 by 4 instead of 34 by 4, giving a lower car. The Knight type motor was adopted by the company in its plan for developing a high-speed small car as the most suitable high speed construction inasmuch as the trouble often experienced in positively opening and closing valves is so well guarded against in this motor. The chassis of the car will be of high carbon chrome vanadium steel throughout.

Sunbeam Engineer and Driver for Indianapolis

INDIANAPOLIS, IND., Jan. 30—Louis Coatalen and Dario Resta the chief engineer and the leading race driver identified with the Sunbeam company will drive their cars in the 500-mile race at Indianapolis, May 30. Mr. Coatalen by birth a Frenchman, is British by naturalization and has been resident in England for many years. Connected with the Humber company he produced a car in 1904 which was a big advance on any previous Humber model and earned for the engineer considerable fame. Joining the Sunbeam concern a few years later his facility for efficient motor production, neat design and up-to-date factory management soon became apparent so that Sunbeam stands today amongst the foremost of British automobile firms in quantity of output and easily first in the racing field.

Coatalen has done a good amount of driving on both road and track, but has not taken a steersman's part in racing lately, his genius for organization proving more valuable in the pits than at the wheel, and the credit for the Sunbeam success is largely due to the perfect management of the tire changing, fuel replenishment, etc. Resta is one of the favorites with the British racing public, as he has a dogged determination that carries him through difficulties.

LOUIS COATALEN,
Sunbeam engineer

The Week in the Industry

Motor Men in New Roles

SEVIER JONES Sales Manager—The Jones Motor Car Co., Wichita, Kan., which was recently organized to make the Jones six-cylinder cars, has started operation in its new plant at 210 West Douglas avenue, with a force of thirty to forty men for the present. V. T. Sevier, formerly of the Farmers and Bankers' Life Insurance Co., has been appointed sales manager; E. E. Stroup, his assistant; Charles H. Smith, advertising manager.

Chamberlin Mgr.—D. W. Chamberlin has been appointed manager of the Cleveland, O., branch of the Kelly-Springfield Tire Co.

Thompson Velie Truck Sales Mgr.—Capt. M. S. Thompson has been appointed manager of the truck sales and service department of the Velie Motor Car Co., Cleveland, O.

Cairns Leaves Parish and Bingham—William Cairns is no longer in the employ and capacity of general manager and sales representative of the Parish & Bingham Co., Cleveland, O.

Halligan Heads Chalmers U. C. Dept.—Fred Halligan, formerly with the Boston Locomobile company, is now in charge of the used car department of the Chalmers Motor Co., of Boston, Massachusetts.

Collins Sales Mgr.—B. W. Collins has become sales manager of the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. He was formerly with the Lozier Motor Co., Detroit, as assistant to the president.

Faust Buffalo Mgr.—A branch has been opened in Buffalo, N. Y., under the management of H. C. Faust at 20 Goodrich street, by the H. C. Faust Co., Philadelphia, Pa., manufacturer of the Panther spark plugs.

Smith Resigns—E. D. Smith, until recently manager of the car order department of the Chalmers Motor Co., Detroit, Mich., has resigned to become manager of the Detroit branch of the Reed Self-Adjusting Weather Strip Co., Wichita, Kan. Offices have been secured at 805 Chamber of Commerce Bldg.

Talbot Succeeds Holihan—R. Talbot, vice-president of the National Bank of Commerce, Detroit, Mich., has been named president of the Holihan Mfg. Co., Detroit, succeeding J. A. Holihan. William Christian has been appointed manager of the company, which will continue to make automobile radiators and other metal specialties for the automobile industry.

Poyer Assistant Sales Mgr.—C. E. Poyer has been appointed assistant general sales manager of the Edison Storage Battery Co. Mr. Poyer has been with the Edison interests for about 4 years, having served first on the personal engineering staff of Mr. Edison in the development of special application of the alkaline battery, and later as assistant advertising manager. For the last 2 years he has been manager of the house lighting department.

Garage and Dealers' Field

Pullman Agency in Australia—J. J. Hughes, Sydney, Australia, will handle the Pullman car.

Toledo Peerless Tire Moves—The Peerless Tire & Rubber Co., Toledo, O., will move shortly into its new and larger quarters at 713 Jefferson avenue.

Newark Chevrolet Moves—The Chevrolet Motor Co., New York City, has leased the two-story building at 307-309 Central avenue, Newark, N. J., to be occupied by February 1.

Wille Piston Co. Dissolved—The Wille Piston Co., 1534 Fulton street, Brooklyn, N. Y., has been dissolved. The business will be continued by P. A. Wille under the name of the Wille Piston Works.

St. Louis Ford Adding—An addition is being built to the St. Louis, Mo., branch of the Ford Motor Car Co. The new building, a one-story structure, 40 feet by 50 feet, will be used as a storage room for parts.

In New Salesrooms—The Williams Motor Car Co., agent for the Dodge Brothers car at Springfield, Mass., has moved into its new salesroom in the building at the corner of Worthington and Chestnut streets.

Buick In New Home—The Buick agency in Providence, R. I., is located in its new home at 37 Chestnut street, where it has the entire building for a salesroom and service station near the main arteries of travel.

Detroit Co. Moves—The Barton Auto Top Co., formerly at 65 East Fort St., is now located in its new quarters at 863 Woodward avenue, Detroit, Mich., where it will continue the manufacture of slip covers, dust hoods, automobile curtains and automobile tops.

Kelly-Springfield Tire Agency Moves—The Kelly-Springfield Tire & Rubber Co., San Francisco, Cal., which recently enlarged its branch and appointed W. H. Bell as district manager, with headquarters in this city, on February 1 occupied its new quarters on Van Ness avenue.

Marketing K. and M. Piston Ring—A new type of piston rings, known as the "K. and M. Conform," is now being made by the Modern Electric Motor & Machine Co., Indianapolis, Ind., and marketed by the Superior Auto Parts Co. L. J. Eby is sales manager of the concern.

Artificial Leather Co. Moves—The Du Pont Fabrikoid Co., Wilmington, Del., has moved its office from 621 Broadway, New York City, to 90 West street. The latter address is only temporary, until it can get into its new and permanent quarters in the new Equitable Bldg., 120 Broadway.

To Distribute Johnson Shock Absorbers—A new store and service station will immediately be opened by the Triple Action Spring Co. in San Francisco for the distribution of the Johnson shock absorbers for the entire state of California. It is expected that in the near future agencies will be opened in Los Angeles, Oakland, Berkeley, Sacramento, San José, Santa Barbara and Pasadena.

New Company at Providence, R. I.—The Guaranty Used Motor Car Co. has been formed at Providence, R. I., to rebuild and market second hand cars. C. P. Walker, formerly with the Jackson agency in Boston, is at the head of the new concern and it has leased the two-story building on Atwell's avenue formerly used by the White Co. for a service station.

Will Handle Accessories—A partnership has been formed between J. Wetzel and Charles M. Hall, of Detroit, Mich., who was formerly manager of the Parish Mfg. Co., Detroit. They will handle automobile accessories. The automobile accessory business conducted by McLean & Freeman, at 1575 Woodward avenue, has been taken over by E. M. Morris, formerly assistant secretary of the Northern Motor Car Co., also assistant sales manager of the E-M-F Co., and at one time general manager of the Great Western Auto Co., Peru, Ind.

New Service Plan—The Van Sicklen Co., Aurora, Ill., manufacturer of the Van Sicklen speedmeter, has a new plan for service to the owners of cars equipped with its instruments. The car manufacturers adopting the speedmeter as standard equipment furnish a list of their representatives to whom a letter is addressed describing the proposed plan, stating that upon receipt of information regarding the probable number of cars the dealer will sell during the season, the Van Sicklen Co. will send to the dealer a service package containing the parts he is liable to need based on the number of cars handled.

Recent Changes in Kansas City—The Scarritt Motor Car Co., Stearns distributer, Kansas City, Mo., has incorporated. The company was formerly known as the White Motors Co. The company has the distribution for Stearns cars in Kansas, western Missouri and northern Oklahoma. The Kansas City Auto Parts Co., Kansas City, will open around February 15 to handle a complete stock of automobile supplies and accessories. G. V. Nelson is manager. The Kansas City White Co. has been organized with headquarters at 928 East Fifteenth street to handle the White car and truck. John Toole is manager.

Recent Indianapolis Changes—The following changes have taken place in the Indianapolis, Ind., trade: J. M. Ward, for 2 years factory representative for the United States Tire and Rubber Co., has been made manager of the company's local sales branch. The election of Tom L. Marshall as treasurer of the Marion Motor Co. is announced. H. W. Martz, who has been distributor for the Maxwell, has become distributor for the Briscoe and has opened new quarters at 646 North Meridian street. A large store for the sale of tires and accessories has been opened at 213 South Illinois street by G. F. Kreitlein, who has had several years' experience in the business.

Factory Miscellany

LARGE War Order on Milling Machines—The Kearney & Trecker Co., Milwaukee, Wis., a large manufacturer of milling machines, started shipments January 29 on an order for 120 Milwaukee milling machines contracted for by the French government for use in its arsenals, armament factories and motor car manufacturing and repair shops. It will require more than 6 weeks to complete the delivery.

Duesenberg Bros. Open Plant—Duesenberg Bros., St. Paul, Minn., have opened their new motor building plant.

Stewart & Clark Adds—The Stewart & Clark Mfg. Co., manufacturers of automobile supplies, 1828 Diversey boulevard, Chicago, Ill., will construct a six-story addition to cost $75,000.

May Build Automobiles—W. A. Williams, of the Independence Motor Car Co., Lima, O., is reported to be planning the establishment of a new plant for the manufacture of automobiles.

Elyria Plant for Overland Parts—The plant recently used for the manufacture of the Willys Utility and Garford trucks at Elyria, O., will be employed in the manufacture of Overland parts.

Regal to Enlarge Berlin Plant—The Regal Automobile Co., Detroit, Mich., will construct a large addition to its plant at Berlin, Ont., in the spring. It is in the market for machinery.

To Manufacture Spring Wheels—W. B. Rosenburg, Corbin, Mont., and W. A. Black, Livingston, Mont., plan to establish a factory in Seattle, Wash., for the manufacture of spring wheels for automobiles.

Branch Factory for Fair-Anderson—The Fair-Anderson Co., Chicago, Ill., contemplates the establishment of a branch factory for the manufacture of automobile tires. The estimated cost is $125,000.

New Plant for Calgary—The Ingram-Hatch Motor Corp., 2 Stone street, New York City, is planning to build a plant at Calgary, Alta., for the manufacture of automobiles and motor trucks operated by oil engines.

De Mooy Bros. Add—De Mooy Bros., 1931 East 55th street, Cleveland, O., are making arrangements for the construction of an automobile plant in connection with their present plant. The estimated cost is $6,000.

Falls Rubber Buys Wire Plant—The Falls Rubber Co., Cuyahoga Falls, O., has purchased the old plant of the wire mill company on East Broad street, which will be converted into a modern plant for the manufacture of tires.

To Manufacture Trucks—The Chester County Motor Co., Coatesville, Pa., has increased its capital stock to $500,000 and plans the construction of a factory for the manufacture of commercial trucks. J. Edwin Brinton is president.

Montana Co. Manufacturing Spring Wheels—The Montana Improved Spring Wheel Co., Livingston, Mont., is preparing plans for the construction of a plant to manufacture spring wheels for automobiles. The plant will employ about 300 men.

Hartford Tire Pump Adds—The Hartford Tire Pump Co., Hartford, Wis., is installing additional equipment, including a large oxy-acetylene welding and cutting apparatus for its own uses, but will do custom work for motorists needing welding repairs.

Mercer Automobile Club Formed—The Mercer Automobile Co., Trenton, N. J., foremen and members of the office force have formed the Mercer Automobile Club, the object of which is to hold an occasional get-together meeting for the promotion of greater co-operation.

Manufactures Anti-Freezing Liquid—The Can't Freezit Chemical Co. is the name of a new concern located at 187½ South High street, Columbus, O., which manufactures a liquid to be used in radiators to prevent freezing. A great deal is claimed for the preparation.

Fire Damages Canton Plant—Fire of unknown origin destroyed the administration building of the Cleveland Axle Co., Canton, O., and the Cleveland-Canton Spring Co., January 24. The remainder of the factory was saved. The blaze started under the stairway of the building.

Jiffy Jack for Grand Rapids—The Jiffy Jack Co. is Grand Rapids' latest addition to the automobile accessory manufacturing industry. H. E. Hosken is prime mover in the enterprise. The company makes jacks for raising automobiles, four jacks being the complement, two being used on each axle.

Columbus Concern Makes Motors—The Ohio Engine Co., Columbus, O., recently incorporated with a capital of $25,000, will manufacture small motors for the farm trade. M. H. Joy, manager of the Ohio Engine Sales Co., is the promoter of the new concern, which will establish a plant in Sandusky.

Peckham Looking for Plant—G. G. Peckham, formerly proprietor of the Peckham Motor Car Co., Dayton, O., who has been in the automobile business in Toledo for several months, has returned to that city and is looking for a site upon which to construct an automobile plant. Toledo capital is interested in the project.

Magnus Co. in Brass Casting Business—The Magnus Co., Detroit, Mich., has been organized to take over the business of the National Fulton Brass Mfg. Co., and will continue the brass casting and foundry business of that concern. The capital stock of the new concern is $100,000 and about 150 men are employed.

Will Manufacture Bodies—The Ohio Carriage Mfg. Co., Columbus, O., which purchased the old plant of the Barndt-Johnson Body and Top Co. on South High street has installed complete machinery for the manufacture of automobile bodies. The company will make bodies for all makes of cars but will specialize on bodies for Ford cars.

Newcastle Rubber Co. Formed—The formation of a new corporation for the manufacture of automobile tires and inner tubes with a capitalization of $500,000 has been made known with the granting at Harrisburg, Pa., of a charter to the Newcastle Rubber Co., Newcastle, Pa. The organization has erected a factory measuring 80 by 340 ft. and the plant will start operations April 1.

Will Start Work on Remy Plant—Construction on the new plant of the Remy Electric Co., which is to move to Detroit, Mich., from Anderson, Ind., will be started in the near future when ground will be broken for the two-story 50 by 150 engineering building. This is to be the first of various buildings which will be erected on Mt. Elliott and the Boulevard. The building will cost about $100,000.

Kelly Truck Addition—The Kelly Motor Truck Co., Springfield, O., will start construction this week on a new addition to be 50 by 260 feet of reinforced concrete. One new addition was completed a little over a week ago and is now being used by the company, and with the second addition the company will have more than a third more working space than when the extensions were started.

Foundry Production Increased 600 Per Cent.—Although the Lansing Foundry Co., Lansing, Mich., has been in business less than 12 months, its production has increased 600 per cent., it is claimed, and made it necessary to increase the working force until it now is 102 men. The officers of the present year are: J. H. Moore, president; Ray Potter, vice-president; C. D. McCormick, secretary and office manager; M. C. Knight, treasurer and factory manager.

To Manufacture $500 Cars in Los Angeles—Another automobile factory for the Pacific Coast became a reality when it was announced recently that the Silent Engine Co. had purchased a large tract of land in the Los Angeles harbor section for the erection of an automobile building and assembling plant. The specifications of the new car are not known as yet, but it has been announced that the company would build a touring car, roadster and light truck which will retail on the Pacific Coast for about $500.

To Manufacture Aluminum Castings—To better designate the nature of the business under the new policy of devoting its entire attention to aluminum foundry business, the Western Iron Works, Manitowoc, Wis., has changed its name to Grimm Aluminum Castings Co. The entire plant is being overhauled and some new equipment installed and in the future only aluminum castings will be produced. A campaign for business among motor car and motor manufacturers will be undertaken at once. Roland Grimm is president and general manager.

New Body Building Concern—The building of metal bodies has been started at Worcester, Mass., by George Demers & Son, long in the blacksmith, carriage building and automobile repairing business at 98 Union street. The company has secured N. Allard, for 14 years one of the expert body builders at the Knox factory at Springfield, Mass., and who later worked for the Springfield Metal Body Co., to take charge of the work. Special machinery has been ordered and the company will go into the business on a good sized scale.

Hupp Starts Work on Four Buildings—The Hupp Motor Car Co., Detroit, Mich., has started work on four new buildings, consisting of a new office building two stories high 1,800 by 300 feet; an engineering building, 200 by 200; a testing laboratory 350 by 200 and a top and body building 1,500 by 300. At least $150,000 will thus be spent and the work was started at this time instead of in the spring in order to give work to many unemployed. The men employed in the erection work are in the direct employ of the Hupp company.

To Mfg. Only Automobile Tires—Consistent with the policy announced recently, the Hartford Rubber Works plant, Hartford, Conn., of the United States Tire company is to manufacture pneumatic automobile tires only. The bicycle tire department has been closed down and the equipment removed to Indianapolis. Additional apparatus for the production of automobile tires is now being installed. The steam kettle room on the west side of the factory is being enlarged. At the present time the factory is said to be working to capacity.

To Market 4-Wheel Drive Tractor—The Utility Steel Tractor Co., organized recently at Antigo, Wis., with $25,000 capital, is preparing to market a light four-wheel drive tractor designed by N. C. Woodin, formerly chief engineer of the International Hoist Co., of Antigo. The company is negotiating with several commercial associations in Wisconsin and Illinois for a site for the proposed foundry and machine shop group it intends to erect during the course of the present year. D. S. Stewart is president; Mr. Woodin, vice-president, and F. A. Hecker, secretary-treasurer.

Homer's Tractor on Market—The Homer Motors Co., with offices at 1119 Van Nuys Building, Los Angeles, Cal., is manufacturing the Homer high-grade motor tractor weighing 4 tons, which sells fully equipped at $3,000. Its other product is the Homer light delivery automobile, capacity 1,000 pounds, 20 horsepower and selling for $600. The company is financed entirely by Los Angeles capital and under the manufacture of J. E. Meyer, president; Dr. J. E. Coweles, vice-pres.; G. W. Bishop, secretary; Geo. F. Thompson, treasurer; J. P. Barker, the inventor, and David Macdonald(directors.

Indiana Plants Busy—There is a very pronounced renewal of activity in the motor car industry of the State with the beginning of the new year. Conditions are not yet normal, but they promise to be so before long. At Kokomo today the plants of the Haynes Automobile Co. and Apperson Brothers Automobile Co. put their full forces at work. Similar reports are being received from other parts of the State. In Indianapolis the Lyons-Atlas Co. is preparing to double its working force. Other plants are taking on additional employees gradually. The Capitol Body Co. is moving into the old No. 2 plant of the American Motors Co. in South Meridian street, Indianapolis, and will increase its force from 125 to 275 employees.

Another Tire Works for Trenton—Another tire manufacturing concern has located in Trenton, N. J., at Mulberry street and New York avenue. The property at this address, formerly occupied by the American Lamp & Brass Co., has been purchased by the Mecca Tire Co., of Philadelphia, and is being remodeled and improved for tire manufacturing purposes. This property covers about 3 acres and contains six brick buildings, each 30 by 90 feet, five of them 2½ stories high and one 3½ stories. These will be equipped with the necessary modern machinery to turn out from 250 to 300 tires per day, and give employment to about the same number of workmen. G. E. Knowles, of Carteret, at one time employed by the Thermoid Rubber Co., and later connected with the Chester Rubber Tire & Tube Co., of Chester, W. Va., will be general manager of the new concern, whose officers are: Charles Buckley, president; William Fullerton, treasurer; W. J. Cassidy, secretary. The plant will not be ready for operation before March 1.

The Automobile Calendar

Jan. 30-Feb. 6....Columbus, O., Show, Memorial Hall, Columbus Auto Club and Columbus Auto Trades Assn.
Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb.....Portland, Ore., Show; Portland Auto Trade Assn.
Feb.....Battle Creek, Mich., Show, Rathbun & Kraft Bldg.
Feb.....Toledo, O., Show, Toledo Auto Show Co.
Feb. 1-6.....Louisville, Ky., Show, Louisville Auto Dealers' Assn., First Regiment Armory.
Feb. 2-7.....Kalamazoo, Mich., Show, Armory.
Feb. 3-6.....Geneva, N. Y., Show.
Feb. 4-6.....Marinette, Wis., and Menominee, Mich., Show, Armory, Marinette, Twin City Auto. Assn. of Marinette.
Feb. 8-11.....Peoria, Ill., Show, Coliseum.
Feb. 8-13.....Salem, Mass., Show, North Street Skating Rink, C. O'Shea.
Feb. 8-13.....Toledo, O., Show, Terminal Bldg., Toledo Auto Shows Co., H. W. Blevins.
Feb. 8-14.....Kansas City, Mo., Show.
Feb. 8-14.....Troy, N. Y., Show, Troy Auto. Dealers' Assn.
Feb. 8-15.....Wilmington, Del., Show, Hotel duPont.
Feb. 9-12.....Eau Claire, Wis., Eau Claire Auto Dealers' Assn.
Feb. 9-12.....Peoria, Ill., Show, Peoria Auto & Motor Cycle Dealers.
Feb. 10-13.....Davenport, Ia., Show.
Feb. 15.....Fort Wayne, Ind., Show, Fort Wayne Auto Trade Assn.
Feb. 15-20.....Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids *Herald;* C. L. Merriman.
Feb. 15-20.....Omaha, Neb., Show, Auditorium, C. G. Powell
Feb. 15-20.....Bridgeport, Conn., Show, State Armory; B. B. Sterber.
Feb. 16-18.....Bloomington, Ill., Show, Deere Bldg.
Feb. 18-20.....Racine, Wis., Show, Lakeside Auditorium, Racine Auto Show Assn.
Feb. 22.....Newark, N. J., Light Car Club of N. J., Hillclimb at Teaneck.
Feb. 22.....San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama - Pacific Exposition Co.
Feb. 22-25.....Allentown, Pa., Show.
Feb. 22-27.....Duluth, Minn., Show, Auditorium.
Feb. 22-27.....New Haven, Conn., Show, Second Regiment Armory; W. N. Lindsay.
Feb. 22-28.....South Bethlehem, Pa., Show, Coliseum; J. L. Elliott.
Feb. 23-27.....York, Pa., Show, Coliseum Hall.
Feb. 23-27.....Syracuse, N. Y., Show, Arena, Syracuse Motor Vehicle Trade Assn.
Feb. 23-27.....Syracuse, N. Y., Show, Armory, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.
Feb. 23-27.....Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.
Feb. 24-27.....Freeport, Ill., Show, Freeport Automobile Show Co.
Feb. 25.....New York City, S. A. E., Metropolitan Sec. Meeting; Report of Research Committee on Kerosene Carbureters. Research Com. Report on Non-Electric Continuous-Torque Transmission.
Feb. 27.....San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama - Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 1-5.....Wilkesbarre, Pa., Show. Vehicle Trades Assn.
Mar.....Benton Harbor, Mich., Show, St. Joseph and Benton Harbor, St. Joseph Garage, St. Joseph.
Mar 3.....Albany, N. Y., Associated Garages of America, General Convention.
Mar. 4-6.....Springfield, Mass., Show; J. H. Graham.
Mar. 6-13.....Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 6-13.....New York City, Made in the U. S. A. Exhibition, Grand Central Palace.
Mar. 8-13.....Indianapolis, Ind., Annual Spring Opening, Indianapolis Auto Trade Assn.
Mar. 8-13.....Canton, O., Show, Auditorium, Stark Co. Auto Show and Electrical Exposition.
Mar. 8-13.....Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 8-13.....Utica, N. Y., Utica Automobile Trade Assn.
Mar. 13-20.....Harrisburg, Pa., Show Arena, Harrisburg Dealers' Assn.
Mar. 14.....San Francisco, Cal., Panama - Pacific Cup Race, Panama - Pacific Exposition Grounds; Promoter, Panama - Pacific Exposition Co.
Mar. 17.....Venice, Cal., Cal. Grand Prix, 300-Mile Road Race.
Mar. 22-27.....Bangor, Me., Show, Bangor Auditorium.
April.....Calumet, Mich., Show, Coliseum.
April 3.....Paterson, N. J., Show, Auditorium, R. A. Mitchell.
May 17-18.....Boston, Mass., A. A. A. Annual Meeting.
May 29.....Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 9.....Galesburg, Ill., Two-mile Track Meet.
June 19.....Chicago, Ill., 500 - Mile Race, Chicago Speedway.
June 25.....Sioux City, Ia., Track Meet.
July 4-5.....Tacoma, Wash., Road Race.
Aug.....Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.
Aug. 2-3.....San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.
Aug. 20-21.....Elgin, Ill., Road Race.
Sept. 20-25.....San Francisco, Cal., International Engineering Congress.

Automobile Agencies Recently Established

PASSENGER CARS

Ohio

Thurston	Krit	Thurston Auto Garage
Tiffin	Oldsmobile	C. L. Fifer & Co.
Urbana	Ford	Frank Ganson, Jr.
Zanesville	Jeffery	Central Garage Co.
Zanesville	Detroit Electric	Central Garage Co.

Oklahoma

Okmulgee	Oldsmobile	Lamberson & McBrayer Bros.
Telsa	Sphinx	F. F. Hannon

Oregon

Portland	Dodge	Covey Motor Car Co.

Pennsylvania

Allentown	Moon	W. F. Rabenold
Ashland	Oldsmobile	J. B. Young
Freeport	Oldsmobile	E. H. Wallace
Huntingdon	Oldsmobile	Port's Garage
Jeanette	Oldsmobile	J. G. Waddell
Lock Haven	Oldsmobile	J. S. Waite & Co.
Mt. Morris	Oldsmobile	Mt. Morris Motor Co.
New Philadelphia	King	Moffitt & Kneuss
Pen Argyl	Saxon	Ackerman Bros.
Philadelphia	Marion	Fanning Motor Car Co.
Philadelphia	Jeffery	Sterling Motor Car Co.
Pittsburg	King	King Motor Sales Co.
Pittsburg	Scripps-Booth	L. G. Martin & Son
Scranton	Scripps-Booth	O. D. De Witt
Sharon	King	Monarch Hardware
Virginville	Oldsmobile	M. W. Smith
Waynesburg	Oldsmobile	Mt. Morris Motor Co.
Wilkes-Barre	Scripps-Booth	D. & H. Automobile Co.
Wilkes-Barre	Oldsmobile	H. M. Ransom

Rhode Island

Providence	Briscoe	Spencer-Wilke Co.
Providence	Saxon	Foster-Smith Co.
Providence	Scripps-Booth	Wallace L. Wilcox & Co.
Providence	Peerless	J. W. Breese

South Dakota

Yankton	King	E. W. Crane

Tennessee

Chattanooga	Franklin	J. H. Alday

Texas

El Paso	Franklin	The Oakland Auto Co.
Houston	Saxon	J. M. McDade Auto Co.
Menard	Oldsmobile	J. A. Bevans
Pampa	Oldsmobile	D. B. Stribling
Vernon	Saxon	A. B. Swartwood

Utah

Ogden	Oldsmobile	L. P. Wright

Vermont

Rutland	Saxon	Rutland Mach. & Auto Co.

Virginia

Pulaski	Oldsmobile	Pulaski Motor Car Co.

Washington

Almira	Dodge	J. T. Callanan
Bellingham	Oldsmobile	Bay City Motor Car Co.
Blueston	Paige-Detroit	C. W. Gilstrap
Centralia	Buick	R. N. Berlin
Colfax	Dodge	Colfax Garage
Columbia	Cadillac	Wood & Lane
Colville	Dodge	M. E. McCauley
Deer Park	Dodge	W. M. Critzer
Garfield	Dodge	Garfield Hardware Co.
Hoquiam	Buick	George Rhines
Lincoln	Studebaker	Eastman Motor Car Co.
Oakesdale	Dodge	Linville Bros.
Ritzville	Dodge	J. Friesinger
Rosalia	Dodge	Rosalia Auto Co.
Seattle	Jeffery	F. H. Bardshar
Spokane	Franklin	Franklin Auto Sales Co.
Spokane	Studebaker	Eastman Motor Car Co.
Tacoma	Ford	Sullivan & Volk
Tacoma	Maxwell	Tacoma Motor Car Co.
Walla Walla	Cadillac	Wood & Lane
Waverly	Dodge	C. K. Thayer
Wilbur	Dodge	Enterprise Garage

Wisconsin

Appleton	King	H. E. Griffin Auto Co.
Beloit	Argo	J. W. Menhall Auto Co.
Bloomington	Allen	Knapp & Hillary
Cuba City	Apperson-R.C.H.	Hein Brothers
DePere	Hupmobile	Ray Marcott Co.
Durand	Franklin	J. P. Unswer
Edmund	Glide	Daniel Lee
Elmwood	King	Rice & Webb Motor Co.
Ft. Atkinson	Glide	Vance & Roos
Galesville	Oldsmobile	A. J. Olsen
Glenwood City	Overland	Glenwood Auto Co.
Howard's Grove	Partin-Palmer	Frome-Kaiser Auto & Impl. Co.
Kilbourn City	Apperson-R.C.H.	O. E. DeWitt
La Crosse	Durant-Dort	La Crosse Auto Co.
Lancaster	Glide	W. A. Jerrett
Milwaukee	Oakland	Dewitt-Schank Motor Sales Co.
Milwaukee	Monroe	Frint Motor Car Co.
Milwaukee	Argo	Milwaukee Cycle S. & Sales Co.
Milwaukee	Allen	Dieman Motor Co.
Milwaukee	Moon	Durbin & Thomas
Milwaukee	Grant	Diener-Nelson Co.
Monroe	Buick	Geiger, Fasser & Lynch
Monroe	Ford	Geiger, Fasser & Lynch
Monroe	Hudson	Geiger, Fasser & Lynch
Monroe	Reo	Geiger, Fasser & Lynch
Neenah	Scripps-Booth	J. L. Densenbrenner
New London	Apperson	W. F. Block
New London	New R.C.H.	W. F. Block
Richland Center	Ford	E. A. Prouty
Stoughton	Apperson-R.C.H.	Trace Christenson
Tigerton	Overland	C. A. Roepke
Tigerton	Studebaker	C. A. Roepke
Tigerton	Maxwell	C. A. Roepke
Tigerton	Ford	C. A. Roepke
Watertown	Glide	F. G. Buroff Motor Car Co.
West Bend	Dodge	Meyer Bros.

COMMERCIAL

Alabama

Dothan	Koehler	W. L. Brown

California

Oakland	Signal	Osen & Hunter Auto Co.

Canada

Vancouver	Signal	H. J. Tucker

Georgia

Albany	Koehler	Anderson & Ivey

Iowa

Council Bluffs	Koehler	Marion Auto Co.

Kentucky

Harrodsburg	Koehler	Ingrams Garage
Louisville	Koehler	Strube's Garage
Louisville	Signal Truck	Louisville Motor Co.

Massachusetts

Boston	Atterbury	L. M. Harmon
Boston	Denby	Denby Motor Car Co.
Boston	Mais	Myer Abrams Company
Worcester	Vim	Franklin Square Garage

Michigan

Battle Creek	Signal	B. N. Beedon
Detroit	Signal	The Moritz-Mullin Co.
St. Joseph	Signal	Burkhard Bros.
Wayne	Signal	The Moritz-Mullen Co.

Missouri

St. Louis	Kissel	Colonial Motor Car Co.

Montana

Butte	Signal	Inter-Mountain Auto Truck Co.

New Jersey

Cape May Court House	Koehler	Dix Auto Co.
Hightstown	Koehler	Thomas Peppler & Son

New York

Buffalo	Signal	A. J. Sanderson

Ohio

Cleveland	Signal	Curtis Bros.
Columbus	Vim	The Brasher Motor Car Co.

Pennsylvania

Chambersburg	Koehler	J. A. Schaal
Houtzdale	Koehler	H. J. Wagner
Philadelphia	Signal	Interboro Motor Truck Co.
Pittsburg	Signal	Stewart Motor Truck Co.
Steelton	Koehler	W. F. Maginnis

Rhode Island

Providence	Koehler	Capitol Motor Car Co.

Tennessee

Clarksville	Koehler	Clarksville Auto & Repair Co.

Washington

Seattle	Signal	Waterhouse-Sands Motors Co.
Spokane	Signal Truck	Arthur Hertz

Recent Incorporations in the Automobile Field

New York

NEW YORK—Hecht's Magneto Exchange; capital, $5,000; ignition products and other motor car accessories. Incorporators: Alex. S. Hecht, Emil M. Lowy and Leo L. Lowy, all of 854 Intervale avenue.

NEW YORK—International Tri-Ricksha Co.; capital, $500,000; to operate a motor livery, taxicabs, rickshaws, etc. Incorporators: John P. Mahan, 331 Arlington avenue, Jersey City, N. J.; Archibald McClintock, 182 W. 82d street; Francis Kaley, 47 Bay 22d street.

NEW YORK—K-T Lever Spring Co.; capital, $50,000; to manufacture springs for motor cars, carriages, shock absorbers, etc. Incorporators: W. F. Cornell, T. Johnson and S. Gross, all of New York City.

NEW YORK—Lever Spring Co.; capital, $50,000; to manufacture motor car devices. Incorporators: Emil Koeb and William Koeb, both of 271 W. 87th street; William F. Cornell, 20 Exchange place.

NEW YORK—Magneto Parts Co.; capital, $30,000; electrical and other accessories for motor cars. Incorporators: Emil M. Lowy, Leo L. Lowy and Alex. S. Hecht, all of 854 Intervale avenue.

NEW YORK—Practical Repair Co.; capital, $5,000; motor car repair business. Incorporators: Johann Kahrs and Albert Boehm, both of 320 E. 16th street; Ela Prohaksa, 542 E. 79th street.

NEW YORK—Safety Signal Co.; capital, $200,000; to manufacture devices for motor cars, rubber goods, etc. Incorporators: Arthur W. Dennen and Stanley C. Fowler, both of 19 Cedar street; Rebecca Hilliker, 80 Maiden lane.

NEW YORK—Self-Propelled Car Co.; capital, $500. Incorporators: M. E. Harby, Huntington; Emy Clauss, 1016 Washington street, Hoboken, N. J.; Eva De Tranaltes, 170 W. 98th street.

NEW YORK—Speedograph Sales Corporation; capital, $150,000; to manufacture instruments for recording speed of vehicles, etc. Incorporators: V. V. Lebedjeff, A. B. White and J. W. Bondy, all of 11 Broadway.

NEW YORK—Tire-Seal Co.; capital, $500; to manufacture puncture fillers, tire supplies, etc. Incorporators: George A. Orr and Joseph L. Stiebel, both of Kansas City, Mo.; Morton Wollman, 1 W. 70th street.

ROCHESTER—Rochester Case Sales Co.; capital, $10,000; general motor vehicle business. Incorporators: George H. Parker, 295 Plymouth avenue; William F. Hill, 22 Shepard street; Frank L. Elliott, 60 Plymouth avenue.

SALAMANCA—Salamanca Garage; capital, $6,000; to operate a garage. Incorporators: Robert N. Forbes, Frank J. Eaton and Charles E. Congdon, all of Salamanca.

SYRACUSE—James Tool & Machine Co.; capital, $500; to conduct a motor car repair business and machine shop. Incorporators: Frank P. Davis, Jessie M. Whiteside and Eliza Davis, all of Syracuse.

TARRYTOWN—Tarrytown Garage; capital, $5,000; to operate a garage. Incorporators: C. F. Offenhauser, Mary J. Keith and A. R. Keith, all of Tarrytown.

TROY—Patnaud's Garage; capital, $1,000; to operate a garage. Incorporators: David Patnaud, 154 Ninth street; Harry Benjamin, 686 Third avenue, North Troy; Albert B. Wolf, 5 State street.

Ohio

AKRON—Star Rubber Co.; capital, $1,000; to manufacture rubber goods. Incorporators: George W. Carmichael, J. W. Miller, D. B. Duff, W. E. Wright and W. M. Dabney.

CINCINNATI—Non-pneumatic Suspension Tire Co.; capital, $10,000; to manufacture tires, etc. Incorporators: Anthony Schemel, George Webofritz, E. H. Goosmann, G. W. Mackenbach and H. Serkowich.

CLEVELAND—Humphrey-Kennard Co.; capital, $10,000; to deal in tires for motor cars, etc. Incorporators: J. R. Humphreys, F. C. Waite, C. A. Colvin, E. G. Hoag and L. M. Sewell.

CLEVELAND—Penn Square Tire Reclaiming Co.; capital, $10,000; to manufacture and repair tires. Incorporators: H. L. Heller, O. A. Erb, J. F. Krajewski, I. Grauer and Nathan Herstauer.

YOUNGSTOWN—Auto Truck and Drayage Co.; capital, $10,000. Incorporators: N. L. Norris, J. W. Parkin, C. E. Norris, Evan Butler, E. H. Evans.

Oklahoma

CORDELL—Cordell Ford Co.; capital, $4,000; deal in automobiles. Incorporators: G. C. Naden, M. E. Naden, C. R. Lewis.

TULSA—Tulsa Automobile Assn.; to carry on an automobile club. Incorporators: J. L. Gillespie, C. S. Avery, O. R. Howard, J. A. Hull, L. N. Ewing, Fred Shaw.

Tennessee

JOHNSON—Ward's Garage; capital, $5,000; to conduct a garage, buy, sell and operate motor cars. Incorporators: Charles D. Vance, O. P. Ward, P. M. Ward, Charles Bayless and David Miller.

Vermont

BARRE—Brown Motor Car Co.; capital, $50,000. Incorporators: N. D. Graves and others.

Virginia

NORFOLK—H. H. Johnson Co.; capital, $3,000 to $5,000; to deal in motor cars. Incorporators: J. T. Nicholson, Jr., and H. H. Johnson, both of Norfolk, and others.

NORFOLK—Norfolk-Buick Motor Car Co.; capital, $15,000; to deal in motor cars. Incorporators: George F. Edwards, Victor de Murguiondo and H. C. Sherritt, all of Norfolk.

RICHMOND—Dominion Motor Co.; capital, $10,000; to deal in motor cars. Incorporators: John E. Swartwout and W. J. Miller, both of Richmond, and others.